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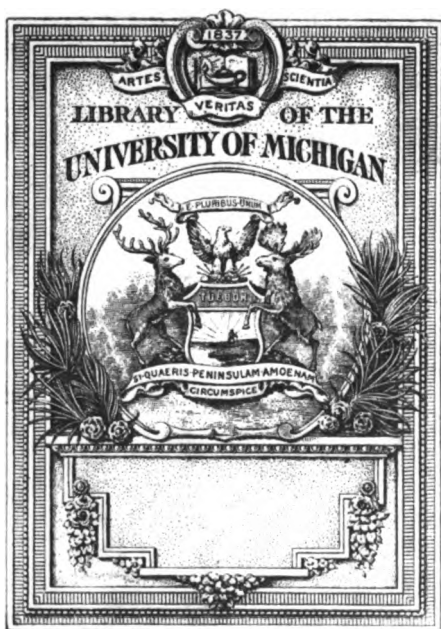


PLATE I.
FIG. 1 and 2 (A and B).

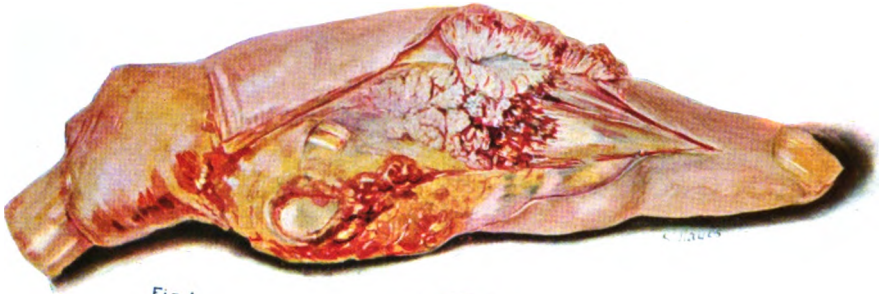


Fig A.



Fig B

A, Section through tumor shown in B. B, Carcinoma spinocellulare. Male, aged 74; tumor two years; onset in area of senile keratosis. Fungous tumor on back of hand. (Pathol. No. 9422.)

[See p. 277.]

INTERNATIONAL CLINICS

A QUARTERLY

OF

ILLUSTRATED CLINICAL LECTURES AND
ESPECIALLY PREPARED ORIGINAL ARTICLES

ON

TREATMENT, MEDICINE, SURGERY, NEUROLOGY, PÆDIAT-
RICS, OBSTETRICS, GYNÆCOLOGY, ORTHOPÆDICS,
PATHOLOGY, DERMATOLOGY, OPHTHALMOLOGY,
OTOLOGY, RHINOLOGY, LARYNGOLOGY,
HYGIENE, AND OTHER TOPICS OF INTEREST
TO STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION
THROUGHOUT THE WORLD

EDITED BY

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Treatment

THE HOSPITAL FOR ADVANCED CASES OF TUBERCULOSIS *

BY LAWRENCE F. FLICK

THE hospital for advanced cases of tuberculosis and for early cases in the acute stage of the disease is our most valuable asset in the crusade against tuberculosis. It answers the purpose of the philanthropist, the charity worker, the statesman, the physician and the sociologist. It possesses every element of usefulness found in other measures at our command and some in a much higher degree. It strikes at the root of the disease by bringing contagion under control when it is most intense. It furnishes us with a humane isolation of a tuberculous subject when his isolation is of greatest value to the community.

During the greater part of the duration of tuberculosis the disease is noncontagious. It is noncontagious in the lymphatic stage and it is practically noncontagious in the infiltration stage of other organs until ulceration takes place. Even after ulceration there are long quiescent periods during which it is noncontagious. It is true that tubercle bacilli may be eliminated during the closed stage of the disease by the urine and probably also by the feces but elimination by these routes does not constitute contagion under ordinary conditions at least. As a rule contagion begins with ulceration and continues so long as broken down tissue is given off. The intensity of the contagion varies according to the amount of broken down tissue given off. During acute processes in the early stage of the disease, when nodules are breaking down and coming away, contagion may have a fairly high potency; but during the advanced stage of the disease, when

* Address before the Maryland Sanatorium Association at the opening of the Marie Bloede Memorial Hospital for advanced cases of Tuberculosis at Endowood.

broken down tissue is constantly given off and there is secretion from cavities which contains tubercle bacilli, it reaches its highest potency. In this stage the bacilli are numerous and are mixed with so much mucus and débris as to make their preservation and distribution outside of the host easy, and their destruction by the elements difficult.

Implantation of tubercle bacilli depends mainly on two things: susceptibility and potency of the contagious environment. Everyone has resistance to implantation, but it varies, and the point at which it stops constitutes what we call susceptibility. It is probable that the most susceptible person can resist implantation out of doors because it is difficult to take into one's system enough tubercle bacilli out of doors even while in close proximity to a consumptive to produce an implantation. The sputum which is ejected in the open air soon becomes diluted and the bacilli become so attenuated that it is difficult for any one to be exposed to it long enough and intimately enough to get an implantation. Even the danger from dragging such sputum into the house must be very small. The contagious environment, which means something in the propagation of tuberculosis, exists really in an enclosure of some kind, the home, the workshop or the meeting place. In this environment the bacilli-carrying matter accumulates and the contagion grows in intensity until it reaches a potency capable of giving an implantation. This kind of an environment may reach a potency of contagion which no one can resist.

The most frequent place of infection undoubtedly is the home of the advanced consumptive. This is where the largest amount of bacilli-carrying matter is given off and where it accumulates to the highest degree of contagious potency. Uncleanliness, poverty and want enter into the problem.

It is theoretically possible to make the advanced consumptive noncontagious in his home by absolute cleanliness, but to do so requires knowledge and means. With nurses who have been trained to look after the consumptive any consumptive can be made noncontagious. Every particle of bacilli-bearing matter when given off from the body must at once be disposed of in such a manner that neither the person giving it off nor anything in his environment becomes contaminated. The patient must hold some material

before his mouth when he coughs and sneezes to avoid spraying bacilli-bearing matter into the atmosphere and over his clothing and furniture; he must carefully fold up that material and immediately deposit it where it can do no harm; he must hold some vessel close to his mouth when he expectorates so that he does not spray any of the sputum; he must wipe his lips after expectorating and carefully fold up the napkin which he has used and deposit it in a paper bag; and he must burn or sterilize all the sputum and the materials used for it. He must under no circumstances soil his own person without immediately cleansing the part soiled. If by any accident he deposits any bacilli-bearing matter on his clothing, on his bed linen or upon anything in his environment the soiled article must be promptly cleansed or removed. All of this is simple enough but it requires special knowledge, skilful training and some means to carry it out. It is not feasible in the homes of the poor and often not in the homes of the fairly well-to-do.

For the poor and for the working classes residence in a hospital during the advanced stage and acute conditions of the early stage of tuberculosis is necessary for prevention of the spread of the disease. This is the isolation which is called for in tuberculosis. All other preventive measures are of little importance compared with this and without this it is questionable whether tuberculosis can be stamped out. This measure if humanely applied even in an incomplete manner would by itself stamp out tuberculosis. Of the truth of this we have much evidence.

At the Phipps Institute in Philadelphia where we have used various preventive measures isolation of the advanced consumptive has given by all odds the best results. The Institute has fifty-two beds for advanced cases and does a large careful dispensary work. It tries to bring its dispensary patients under control and supplies them with material necessary for preventive purposes. It inspects them and teaches them how to use preventive measure supplies. A careful analysis of the work of the Institute and its results during the first three years published in the third volume of its Reports shows that in those parts of the City where the percentage of isolation was greatest there was the greatest reduction in the death rate. The period is too short to permit of

definite conclusions, and the work of the Institute standing alone could not be accepted as an indication of the value of preventive measures were it not supported as it is by work which has been done in other countries for longer periods.

In the history of tuberculosis in England we have a striking lesson of the value of the consumption hospital for the prevention of tuberculosis. England began to establish consumption hospitals, for religious and philanthropic reasons only, early in the nineteenth century. She really started her first tuberculosis hospital in 1791 when the Royal Sea Bathing Infirmary for scrofula was founded, but as this institution was not for open tuberculosis we must set the beginning of her era of consumption hospitals with the opening of the Royal Hospital for Diseases of the Chest in 1814. Since then she has established many consumption hospitals, all of them founded until recently on the basis of religion and philanthropy. In 1840 the consumption hospitals of England could take care of five hundred patients a year, in 1850 of two thousand, in 1860 of three thousand, in 1870 of forty-five hundred, in 1880 of fifty-five hundred and in 1890 of seven thousand.¹ With the discovery of the Koch bacillus England along with the rest of the world became more active in tuberculosis work and began to supplement its work with work inspired by science. Prior to that time practically all beds were open to consumptives in the advanced or the acute stage of their illness. Since then sanatoria for the treatment of early stage cases have been established but the hospitals still are doing their good work and many of them have increased their capacity. According to Bulstrode, England had a hospital and sanatorium capacity of fifteen thousand patients a year in 1906.

Wonder has been expressed at the great reduction in the death rate from tuberculosis in England without any measures for prevention having been specifically introduced. This reduction has been misinterpreted by some and used as an argument against the value of preventive measures, it being said that reduction in the death rate from tuberculosis comes naturally with improved sanitary conditions and with better living, and by inference that specific preventive measures are unnecessary. These deductions do not accord with the facts. If the reduction in the death rate from

tuberculosis in England proves anything it proves that isolation during the contagious stage of the disease is the most valuable asset at our command for prevention and that it is perhaps the only measure of any great value for this purpose. The reduction in England has gone hand in hand with the increase in the isolating capacity of the English hospitals and what is still more striking has been greatest in those parts of England where the isolating capacity has been greatest.

From 1850 to 1860 the annual isolating capacity of the consumption hospitals of England and Wales was approximately 4 per cent. of the annual death rate from pulmonary tuberculosis and between 1851 and 1861 there was a reduction in the death rate from pulmonary tuberculosis of about 5 per cent. on the mortality of 1851. From 1860 to 1870 the annual isolating capacity was approximately 6 per cent. of the annual death rate and between 1861 and 1871 there was a reduction of approximately 10 per cent. on the mortality of 1861. From 1870 to 1880 the annual isolating capacity was approximately 9 per cent. of the annual death rate and between 1871 and 1881 there was a reduction of approximately 20 per cent. on the mortality of 1871. From 1880 to 1890 the annual isolating capacity was approximately 11 per cent. of the annual death rate and between 1881 and 1891 there was a reduction of approximately 16 per cent. on the mortality of 1881. From 1890 to 1900 the isolating capacity was approximately 15 per cent. of the annual death rate and between 1891 and 1901 there was a reduction of nearly 20 per cent. on the mortality of 1891. By 1906 the annual isolating capacity had reached nearly 40 per cent. of the annual death rate and between 1901 and 1906 there was a reduction in the death rate of nearly 12 per cent. on the mortality of 1901.² This was for a period of five years only. It will be noted that the isolating capacity as given is annual and that the reduction in the mortality is for ten years and in the last division five years. It has been said that so small an isolating capacity could not produce so big a result. A careful study of the figures shows that the percentage of isolating capacity is much greater than the percentage of reduction.

That there is a causal relationship between the isolating capacity

of the English consumption hospitals and the reduction in the death rate from tuberculosis in England seems to be indicated by the concomitance of the two and by the even ratio which has kept up between them. It is true there seems to have been some reduction in the death rate from tuberculosis in England before any consumption hospitals were established. A careful analysis of the mortality statistics of England from the beginning of the Registrar-general's office to the present time leaves one in doubt as to the reality of this reduction. Some of the reduction indicated by the official mortality statistics undoubtedly was due to change of nomenclature.³ When the Registrar-general's office was opened many cases of tuberculosis which prior to that time had generally been recognized as consumption and were recorded as such were reported under indefinite names. Later on as physicians under the stimulation of the Registrar-general's office became more accurate in their diagnoses these indefinite terms made way for the more exact term of phthisis, and in some instances of tuberculosis of some special organ. The change in nomenclature worked two ways: during the early part of the Registrar-general's term of office it left the mortality rate from tuberculosis lower than it should have been and during more recent times it increased it. But even with the errors from this source included in the problem it is quite evident that the real decrease in the death rate from tuberculosis in England began with the second half of the nineteenth century and with the establishment of the consumption hospitals.

The harmony between the isolating capacity and the reduction in the death rate is complete except for the period between 1881 and 1891 when the reduction in the death rate fell behind the isolating capacity. This no doubt was due to the discovery of the tubercle bacillus and the more accurate diagnoses which followed. The harmony was partially restored in 1890 and fully restored in 1900. The causal relationship between the two is supported by this hiatus, and the hiatus is perhaps the strongest argument which can be made for the causal relationship.

The cumulative value of isolation is shown in the gradual rise, with the exception mentioned, of the percentage of reduction. Between 1850 and 1860 the isolating capacity was approximately

4 per cent. and the reduction 5 per cent.; between 1860 and 1870 the isolating capacity was approximately 6 per cent. and the reduction 10 per cent.; between 1870 and 1880 the isolating capacity was approximately 9 per cent. and the reduction 20 per cent.; between 1880 and 1890 the isolating capacity was approximately 11 per cent. and the reduction 16 per cent.; between 1890 and 1900 the isolating capacity was approximately 15 per cent. and the reduction 20 per cent.; and in 1906 the isolating capacity had reached 40 per cent. and the reduction for five years was 12 per cent. It would appear that in the great increase of isolation which came with sanatoria after 1882, there was not the same relative value of prevention as had existed in the consumption hospital.

The causal relationship between the isolating capacity and the reduction in the death rate is further supported by the topography of the reduction. Whilst the consumption hospitals of England are scattered over England the greatest isolating capacity has been in London, and none of it has been in Ireland until very recently. The reduction in the death rate has been more rapid in London than for all of England. Between 1864 and 1903 there was a reduction of 1.49 per thousand in London, and between 1864 and 1903 there was a reduction of 1.36 per thousand for all of England.⁴ In Ireland there has been no reduction at all until recently.

A comparison of the death rate from tuberculosis in London with the death rate from tuberculosis in other cities in which there have been no consumption hospitals brings out the cause of the reduction in England even more strikingly. Paris had a death rate of 4.62 per thousand from pulmonary tuberculosis in 1869, and London had a death rate of 2.78 per thousand. London had already reduced its death rate a great deal since the beginning of the century. From 1899 to 1903 the death rate in Paris was 4.28 per thousand and in London 1.74 per thousand. Paris probably has better sanitary conditions than London, a much smaller population and less poverty. Paris has had no consumption hospitals, however. The only factor which has existed in London and which has not existed in Paris capable of accounting for the reduction in the death rate from tuberculosis in London has been the isolating capacity of the London hospitals.

The reduction in the death rate from tuberculosis in Germany when carefully studied in relation to its causes tells the same story as that in England and emphasizes the lesson taught by the reduction in England. Germany has used besides hospitals and sanatoria other weapons in its crusade against tuberculosis such as dispensaries, camps, health resorts and literature and yet as will be seen there is a very close harmony between its isolating capacity and its reduction in the death rate⁵ from tuberculosis.

In Germany private sanatoria were established quite early, the first being that of Dr. Brehmer, of Goerbersdorf, founded in 1854. Quite a number of these sprang up in the forests of Germany. Public institutions were begun in 1892 and sprang into existence everywhere. By 1907 there were ninety-seven of the latter.

The cases isolated in Germany differ somewhat from the cases isolated in England. Germany has built more sanatoria than hospitals and in its public sanatoria at least has tried to treat closed cases only. There have been in Germany, however, some beds for the treatment of open cases, and even in the beds for closed cases, open cases have been treated in spite of all precautions against the admission of advanced cases. This difference in the character of the cases treated in the two countries is apparently discernible in the results. In Germany the reduction in the death rate has been greater for the same period of time than it has been in England but in comparison to isolating capacity it has been less. This variation may be due to the difference between the preventive value of a sanatorium bed and the preventive value of a hospital bed.

What Germany's hospital and sanatorium capacity was prior to 1892 cannot easily be determined. Practically all of the sanatoria which existed up to that time were private enterprises and admitted patients from all parts of the world. That they had some influence on the death rate in Germany cannot be doubted. In 1892 Germany had a public sanatorium capacity of about five hundred patients a year which gave an isolating capacity of about .5 per cent. of her mortality from pulmonary tuberculosis; in 1893 she had a public hospital and sanatorium capacity of about twelve hundred and forty-eight patients a year which gave an isolating capacity of about 1 per cent. of her mortality; in 1894 she had a public bed capacity of about twenty-six hundred patients a year

which gave an isolating capacity of about 2 per cent. of her mortality; in 1895 she had a public bed capacity of about thirty-four hundred patients a year which gave an isolating capacity of about 3 per cent. of her mortality; in 1896 she had a public bed capacity of about forty-two hundred patients a year which gave an isolating capacity of about 4 per cent. of her mortality; in 1897 she had a public bed capacity of about fifty-five hundred patients a year which gave an isolating capacity of about 5 per cent. of her mortality; in 1898 she had a public bed capacity of about eighty-five hundred patients a year which gave an isolating capacity of about 8 per cent. of her mortality; in 1899 she had a public bed capacity of about twelve thousand patients a year which gave an isolating capacity of about 11 per cent. of her mortality; in 1900 she had a public bed capacity of about fifteen thousand patients a year which gave an isolating capacity of about 13 per cent. of her mortality; in 1901 she had a public bed capacity of about eighteen thousand patients a year which gave an isolating capacity of about 18 per cent. of her mortality; in 1902 she had a public bed capacity of about twenty-two thousand patients a year which gave an isolating capacity of about 21 per cent. of her mortality; in 1903 she had a public bed capacity of about twenty-five thousand patients a year which gave an isolating capacity of about 24 per cent. of her mortality; in 1904 she had a public bed capacity of about twenty-eight thousand patients a year which gave an isolating capacity of about 28 per cent. of her mortality; ⁶ in 1906 she had a public bed capacity of about thirty-three thousand patients a year which gave an isolating capacity of 50 per cent. of her mortality.⁷

Between 1875 and 1885 the mortality from tuberculosis in Germany remained approximately the same. It was 3.19 per thousand in 1875 and 3.07 per thousand in 1885, a reduction of .12 per thousand, about 4 per cent. on the mortality of 1875. From 1885 to 1892, with the mortality at 2.50 per thousand in 1892, there was a reduction of 0.57 per thousand, about 18 per cent. of the mortality of 1885. From 1892 to 1902, with the mortality at 1.90 per thousand in 1902, there was a reduction of .60 per thousand, about 25 per cent. of the mortality of 1892. Between 1902 and 1906, with the mortality at 1.72 per thousand in 1906, there was a reduction of .18 per thousand, about 10 per cent. of the mortality of 1902.⁸

The relationship between the isolating capacity and the reduction in the death rate of Germany prior to 1892 can only be surmised. There was some isolating capacity from 1854 on in the private sanatoria and this probably had reached at least 2000 patients a year by 1892.⁹ The influence of these beds must also be counted in with the influence of the public sanatoria after 1892. From 1892 to 1902 the annual isolating capacity of the public hospitals and sanatoria probably averaged 10 per cent. of the mortality from pulmonary tuberculosis, and the reduction in the death rate for the ten years was about 25 per cent. of the mortality of 1892. From 1902 to 1906 the annual isolating capacity of the public hospitals and sanatoria probably averaged about 25 per cent. of the mortality from pulmonary tuberculosis, and the reduction in the death rate for the ten years was about 10 per cent. of the mortality of 1902. This last reduction for a period of four years gives about the same ratio as the reduction of the preceding decade.

A comparison of the isolating capacity and the reduction of Germany, with the isolating capacity and the reduction of England, shows that both the isolating capacity and the reduction of England extended over a longer period than that of Germany, that the reduction was slower but more progressive and that it seems to have had a closer relationship to isolation than the reduction in Germany. The total reduction in England between 1850 and 1906 was about 57 per cent. of the mortality of 1850, about 1 per cent. a year, and the total reduction in Germany between 1892 and 1906 was about 31 per cent. of the mortality of 1892, more than 2 per cent. a year. The average annual isolating capacity of the English hospitals between 1850 and 1906 was probably not over 10 per cent. of the average mortality from pulmonary tuberculosis, and the average annual isolating capacity of the public hospitals and sanatoria of Germany from 1892 to 1906 was probably nearly 15 per cent. of the mortality.

All of the percentages given in this analysis and study of the causal relationship between isolation and reduction in death rate are approximate only. Accurate percentages cannot be worked out with the data available. But even with due allowance for inaccuracies the great value of isolation for prevention is manifest.

The crusade against tuberculosis in which the world is now

engaged is for the purpose of bringing succor, comfort, and happiness to the hundreds of thousands who have been stricken with the disease, to give protection to the millions who have not yet been implanted, and to keep the unborn billions free from the sorrows, afflictions and unhappiness which the disease engenders. It is a warfare for the complete extermination of the micro-organism which has brought so much sorrow to the human family. Victory over this micro-organism has been placed within our reach by the exact knowledge which science has given us. It is not with tuberculosis, as with some other diseases, merely a fight to keep the enemy at bay, but a fight for complete extermination so that there can be no possibility of future onslaughts or inroads upon human happiness.

Man's instinct for saving life is the corner stone of this modern crusade against tuberculosis and the crusade has found its sustenance in the growing faith of the public in the curability of tuberculosis. So long as people believed that consumption was incurable no one was willing to help; but as soon as men saw with their own eyes what modern methods had accomplished for the stricken ones who had regained health, willing hands rose up everywhere and in the twinkling of an eye there was a vast army of men and women burning with zeal for the accomplishment of results in this great warfare.

From the curability of tuberculosis it was an easy step to prevention. The practical demonstration throughout the world of the curability of the disease has set the public mind aflame with the desire to save life also by preventing it. Prevention undoubtedly is more praiseworthy than cure, but it is more difficult for the public mind to grasp the principles concerned in the operation and results of prevention, and it has been necessary that the older work of cure should break the way for the newer one of prevention and thus lead the interest of the people towards this latter problem by gradual stages.

As the crusade against tuberculosis is now constituted and equipped it is a very complicated diversified campaign using many resources and reaching out into every avenue of human endeavor. Science is still its mentor but it has generals in every walk of life. The physician, the philanthropist, the sociologist, the statesman, the captain of industry, the lawyer, the divine, and the educator each

has a well-defined field of operation and a line of battle properly fixed, and all are fighting co-ordinately with a common purpose for a common end.

So many-sided is the campaign and so numerous are the fields of activity in which one may engage that it is difficult to single out that which is preferable. The available resources, however, are still limited, and so long as this is true some fields of activity are better entitled to the resources at our command than others.

The field which undoubtedly offers the best results is the hospital for advanced cases. Unfortunately it is the least attractive, the most difficult to develop and the hardest for which to find laborers. It is unattractive because the objects of its benefaction are beyond the pale of recovery, and the results which can be obtained lack brilliancy and do not stand out well. The hospital for advanced consumptives moreover impresses one theoretically as a very gloomy field of labor. In practice it can be made bright if those who are engaged in it perform their task in a proper spirit and possess optimism. The advanced consumptive himself is a gloomy pitiful object but always has the ray of hope which can be made to brighten his life. His sufferings and helplessness furnish the opportunity and the physical basis for the exercise of those qualities in men and women which elevate and ennoble them and which make the environments in which they live, peaceful, beautiful and attractive. Where the ministering angel of charity plies his calling, where heavenly cleanliness exists, and where reigns the peace which came into the world with the Prince of Peace, gloom has no place of abode and unhappiness cannot dwell. The consumption hospital properly administered becomes the happy portal for the poor stricken brother and sister into the eternal home of peace, and a training ground in virtue for those who are engaged in the work.

By reason of its nature the work of the hospitals for advanced consumptives began as a religious work in exemplification of Christian principles. The first hospital of this kind established, so far as I know, was the Royal Hospital for Diseases of the Chest in London, in 1814. Before this time, namely in 1791, the Royal Sea Bathing Infirmary for Scrofula was founded in Kent County, England, but this was not for advanced cases of consumption.

It was only with the discovery of the tubercle bacillus as the definite cause of tuberculosis that a motive for the establishment of consumption hospitals other than that growing out of philanthropy and religion was possible. The discovery of the tubercle bacillus demonstrated tuberculosis to be a preventable disease and in the prevention of the disease we find a new motive for such hospitals. The new motive came as a reinforcement to the old.

In the light of our present knowledge of both the direct cause and of the contributing causes of tuberculosis we have the strongest possible incentive for the establishment of consumption hospitals in the preventive influence of such institutions. This incentive may well be paramount and when all the facts will be clearly understood by the people at large it will no doubt be found strong enough to lead to the establishment of enough hospital beds to take care of every poor consumptive who needs such assistance.

In the wisdom of the ages no human action has found higher value than saving life. Its performance gives man the stamp of divinity. It is born of the spirit and is in striking antithesis to man's lust for taking life which is born of the flesh. It is instinctive to all men and the best in every man's life is based upon this instinct. It is the foundation of our civilization and has been at the bottom of all the progress which has been made for the betterment of man's condition. It is the spirit of the old and of the new law and has been the inspiration of every code of morals which has been given to mankind.

With the advancement of civilization, man's spiritual yearning to save life is gradually driving his lust for taking life from the field. This is because he understands things better. At the bottom of strife, feud and warfare is the instinct of preserving life, but man does not always understand the relationship. The struggle for the opportunity to live and to thrive, to be comfortable and to be happy, to preserve those who are near and dear brings forth man's savage instinct and tunes him up to kill his neighbor. Man now better appreciates that this is unnecessary, and that it is possible in this world to attain one's own happiness and preserve one's own life to its destined maturity without interfering with the happiness and life of others. In a great measure man's gradual conquest of disease and death has brought him to this position

where he can comprehend the influences which make for his happiness and prosperity and shape his own conduct for the good of others as well as himself.

Few men realize what preventive medicine has done for civilization and how much it has contributed to the world's blessed attitude of mutual forbearance. The relationship between cause and effect is easily lost sight of in the realization and enjoyment of the blessings at hand. It is not easy for the human mind to grasp the entire problem of the evolution of civilization and to see how with each victory of mankind over disease and death and with each accession to man's average years of usefulness and activity the sum total of human intelligence and public weal is increased, placing man thereby on a higher plane of activity and a greater vantage ground from which to forge ahead still further. In the days of the great plagues when cities could not maintain their population by their own birth rates; when civilization received a setback every twenty-five, fifty or one hundred years by a decimation of the urban populations of the world; when man was constantly struggling with disease and death and had ever weighing him down the afflictions which followed in the wake of epidemics, when by reason of the terrible handicaps which he carried in his pursuit of happiness and prosperity he found himself impelled to rob his neighbor and even to kill him in order to get his neighbor's possessions, civilization could not make progress—at least not such progress as it has made since mankind has been freed from these handicaps. One by one the terrible diseases which circulated around the world were brought under subjection by man's intelligence and with each victory man became better able to grapple with the difficulties still in his way.

We have laid behind us in our triumph of civilization plague, leprosy, smallpox, typhus fever, cholera, yellow-fever and malaria. These diseases have been driven from civilized communities and every nation is on its guard against their re-entrance. The micro-organisms which produce them have not yet been destroyed from the face of the earth and the danger of recurrence still exists. Man knows however how to guard against recurrence and by watchfulness will be able to obviate it. Man is about to win fresh victories over diseases and in this generation is destined to bring under

control typhoid fever and tuberculosis. With tuberculosis it is not only possible to bring the disease under control, but to exterminate it. The task will be accomplished chiefly through humane isolation, and the most potent factor of that isolation will be such hospitals as the one which you open to-day.

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OCCUPATIONS AND SO-CALLED RHEUMATIC PAINS *

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GENTLEMEN: I shall present to you to-day a patient who has been a sufferer from pains in the upper arm and shoulders always worse in rainy weather and especially just before a rain storm, whose symptoms are so much better since his case has ceased to be considered as rheumatic in origin that he makes an excellent text for a lesson on pseudorheumatism. His case is very interesting because it represents one of that large class of cases in which it is almost the rule to make the diagnosis of rheumatism on no better grounds than that there is pain in the neighborhood of a joint which has a tendency to be worse in damp weather. As the word rheumatism suggests to the mind of most physicians at once the prescription of the salicylates or related drugs, he has taken his share of these. Occasionally they seemed to do temporary good, but they left his condition unchanged. There are no genuine symptoms of rheumatism. There is no *calor* or *rubor* or *tumor*; no redness or swelling or heat of the part, only vague discomfort.

The word rheumatism like malaria has been much abused. Every febrile condition or vague chilliness for which no cause could be found, was a few years ago labelled malaria even in districts where we now know that there is no malaria. We are getting away from this attitude because now unless the plasmodium can be found we hesitate to use the word malaria. Doubtless a time will come when unless there is or has been a definite story of the symptoms or the actual classical picture of heat, swelling, redness, besides pain, we shall not make the diagnosis rheumatism. As it is at the present time the diagnosis of chronic or muscular rheumatism is usually founded on nothing more than joint discomfort especially in damp

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weather. Toothaches are always likely to occur in such conditions and it is really surprising they are not called rheumatic, for the tooth insertions are after all joints of a special kind. Every other discomfort at such times is. A half a century ago George Eliot said that men like to map out their ignorance in long Greek names. Ordinarily because it has been so long in the language we do not think of rheumatism as a long Greek name, but such it really is. There is no doubt that it does constantly tempt us to map out our ignorance in a term that conceals our lack of knowledge not only from our patients, but sometimes—and this is a much more serious matter—even from ourselves.

Ordinarily chronic rheumatism is supposed to be a rather frequent disease. The term occupies a large space in dispensary reports and a goodly proportion of the patients who come to physicians' offices complaining of pains of various kinds are supposed to be sufferers from it. As a matter of fact careful analysis of most of these cases will show that their symptoms can be explained much better on other grounds than those of rheumatism. Rheumatism is a large mantle that, like charity, may be made to cover a multitude of sins—diagnostic sins. It is rather easy to say the word rheumatism, then it is rather satisfactory to the patient. So many other people suffer from rheumatism that he—and above all she—does not feel lonely in the possession of it, and then they have something to talk about with their friends. When cases are carefully studied, however, chronic rheumatism will be found to be a very rare disease. Personally I have never seen a case that I would care to label chronic rheumatism without further addition. The joint troubles, atrophic and hypertrophic, so commonly called rheumatism, are not genuinely rheumatic and the so-called muscular rheumatisms become a diminishing quantity when patients are examined with due reference to their occupations.

This is all the more important because of the situation that has now developed in medical practice. These cases of so-called rheumatism, chronic or muscular, represent one of the worst stumbling blocks to modern medical practice. These are the cases that keep the quack and the charlatan more constantly at work than any others, and give him his reputation. Patients go to regular practitioners of medicine, have their ailments diagnosed as rheumatic,

are forbidden to take acids and certain vegetables and perhaps red meats, though the reasons for such directions are extremely vague, are given the salicylates and then are expected to get better. They do not get better. After a time they go to someone else, and their first physician is not sorry to have them go as a rule, because he has felt for some time that he was unable to do them any good. After they have gone the rounds of the regular physicians for a time they see the advertisement of some quack or they have an osteopath recommended to them, or some other new fangled method of treatment and then they try that. Occasionally something is done that gives them some measure of relief through manipulation, and then they tell the story of how the regulars failed to benefit them while others helped them very much. Given time and a proper frame of mind any human affection gets somewhat better at least.

Long ago an old English physician said, "It is much more important to know what sort of a patient has a disease than what sort of a disease the patient has." This axiom would usually be supposed to be quite out of date in our time, and yet it has been quoted with approval by two or three prominent clinicians in England and America within the last few years. I do not know any principle that is more important in the practice of medicine than the necessity for treating the individual and not the disease that he has. There is no cut and dried set of rules for the treatment of pneumonia or typhoid fever or anything else. What we have to treat are particular patients suffering from these diseases, and each one of them different, to a more or less marked degree, from anyone else suffering from the same disease. This is the rule that has to be applied in the diagnosis and treatment of these cases of so-called rheumatism. Just in as much as you group them together and treat them by a common formula will you miss the real significance of the affection and fail to benefit your patient. The conditions are often very different and require special treatment in each case.

In most of these cases I have found that the most important element in the production of the painful condition is the occupation of the patient. Certain sets of muscles are used much more than others in the course of his daily work, whatever it may be, and after a time a sense of discomfort occurs in these muscles. Attention is

called to the condition, and the fear of rheumatism comes in to make the discomfort greater. It becomes so much emphasized as to be described as painful. In some cases then there follows the limitation of movement with pain on motion, though this is not always present. Our present case is an illustration of what I mean. The man is a reporter, he writes ten thousand words a day sometimes, and contrary to the custom that is coming in now of using the typewriter, he has the old-fashioned habit of using a pen. Ten thousand words are a good many to write if you have never tried it, and even after you have grown used to it they still make quite a task. It is at times when he has for days in succession the necessity of writing large amounts that he notices the painful condition in his arm particularly. Occasionally he attends the meetings of conventions, and then the discomfort is likely to be very marked. For a long while in spite of this manifest connection of his discomfort with his occupation he thought himself a sufferer from rheumatism.

Rheumatism, as I have said before, like charity may cover a multitude of diagnostic sins. The word is so easy to say, and it is so satisfying to most patients because of the supposed heredity of it. A good many people know or think they know that father or mother suffered from vague pains that were called rheumatic in the past, and so they think that they have inherited them. What foolish nonsense it would be if a father lost a finger and we should expect that the children born after this accident should not have the full quota of fingers. Rheumatism is an acquired disease, almost certainly microbic in character, usually due to a combination of exposures to a particular microbe which probably is not single but multiple and to inclemencies of the weather. That anything acquired in this way should be transmitted to the next generation would amuse a serious biologist. As a matter of fact, however, the parents of the children who so often think they have inherited their rheumatism, acquired the condition that was called rheumatism long after the birth of their children, usually indeed many years after, when they were advancing in age, so that the supposed hereditary element in the case reaches a climax of absurdity. Tuberculosis has been taken almost entirely out of the column of hereditary diseases. Rheumatism should never have been placed in it at all except in

as much as we are all liable to muscle troubles as the years go on.

To come back to our patient then—he has suffered from this painful condition in his upper arm and shoulder (I have mentioned before that he writes much). Ordinarily we think of writers' cramp as the one condition that develops as the consequence of much writing, and that of course involves a more or less acute spasm of the fingers with inability to write, rather than a chronic painful condition. This pain especially of the upper arm is seldom thought of as associated with a large amount of writing, and yet I think that it must be rather common since I have seen a number of cases of it. Nothing is easier than to miss the influence of occupation in these cases. In the course of a ten years' dispensary service at the New York Polyclinic I saw a large number of poor persons, with regard to whose condition the diagnosis of rheumatism had been made. It was surprising in how many of them the location at least of their painful condition could be attributed to their occupation as soon as one took pains to find that out. Most of the cases of lumbago were in two classes of people, men who came from the docks and did heavy lifting with much stooping involved, and tailors who bent much over their work. Ordinarily the two occupations of tailor and stevedore would be supposed to be so widely separated from one another in their effects that by no possibility would they be likely to produce similar pathological results in the muscular systems of the two classes of workmen. The analysis of cases, however, showed that they were much more alike in their effects than could possibly have been anticipated from the general consideration that one of them is an extremely active and the other a very inactive occupation. Both of these classes of workmen, however, were constantly using their lumbar muscles. In some of the men this use, by an individual idiosyncrasy, became an overuse. They were not able to stand as much as their fellows and consequently they suffered.

In those suffering from sciatica nearly the same thing was found. Here there were three classes of people who represented the majority of the sufferers. There were shovellers, and lathe or machine workers, and finally people who stood much on their feet without active exercise. Here once more there is the contrast that exists between the stevedore and the tailor. Standing, however, as

the tailor's stoop for the lumbar muscles, requires the flow of nervous impulses in a constant stream to the leg muscles. We do not stand absolutely immovable, but there is a play of movement between the flexor and extensor muscles keeping us balanced. This flow of impulses, mainly through the sciatic nerve, does not affect everyone, but does affect certain individuals. The result is a painful condition, usually worse on rainy days or at moments when the individual is worried or over anxious.

In the case of the shovellers and the lathe workers it is easy to understand at once how the sciatic nerve becomes exhausted, and therefore may be the subject of low grade pathological conditions of various kinds. The shoveller constantly bends the knee of one leg and then straightens himself. This requires a frequently repeated rather violent effort. The lathe man works his machine all day with one foot and supports himself on the other. Curiously enough it is in the foot on which he stands that as a rule he develops the discomfort which is called sciatica. It requires more effort apparently to hold the body erect than to run the machine, though it is possible that the variety of work and of muscular movement required to run the machine may have a less serious effect. Dentists sometimes suffer in this way, and indeed they themselves talk of "the dental engine halt," which members of their profession used to have so frequently before the electric engine came in.

In a certain number of these cases there is often something more than a neurosis, there is an actual neuritis. The reason for the development of this neuritis is that the overwork required of a particular nerve seems to lessen its resistive vitality. It is easy to understand that the passing of nerve impulses along a nerve means work. If nerves are asked to work up to their limit then there is a form of exhaustion that ensues that makes them especially susceptible to microbic invasion, and as blood is constantly flowing through them and often carrying certain microbes with it the occurrence of the neuritis is easy to understand. Certain toxic substances in the body act the same way. Men who work much outside are prone to take whiskey occasionally during the day. The presence of alcohol in the blood seems to lead to development of a toxic neuritis much more readily in nerves that are exhausted by hard work than in others.

In discussing alcohol and lead neuritis with you we came to the question as to why the substances mentioned have a special affinity as it seems for particular nerves. Lead always attacks the musculospiral by preference, alcohol the anterior tibial. Many reams of paper have been covered with theories with regard to this matter, and very few writers on the subject fail to note the mystery. I have pointed out, however, that the probable explanation is that in persons who suffer from lead and alcohol neuritis these two particular nerves are the most used in the body. The painter handling his brush uses his wrist and his fingers more than does a man in any other occupation. It is in the nerve that supplies these muscles that the symptoms of neuritis first develop. It has been shown in cases where patients have died from an intercurrent disease during the course of a definite plumbic neuritis causing wrist-drop, that other nerves, along which no symptoms were noted, also had signs of the degeneration caused by the presence of lead. None of them were as bad as the musculospiral, because that muscle nerve from overuse had presented less resistance to the degenerative influence of the toxin. As I pointed out the anterior tibial nerve which has so much to do with walking is for many sedentary people the most used nerve in the body because walking is their principal exercise. It may not be much used, but it is more used than any other, and hence gets into the condition of lowered resistance.

In many of these cases there is no neuritis, that is, no inflammation within the sheath of the nerve, but only an exhaustion of nerve structure. Along this impulses pass with difficulty, and the consequence is that muscles much more easily grow tired, and this tiredness becomes a positive discomfort that in sensitive people is described as pain. Many of these cases occur in neurotic individuals who have to perform any habitual set of movements or assume a position and maintain it for a good part of a day. Various stooping positions come in under this head, and complaint is particularly made if the patient has had through any reason to assume constantly such unusual postures during the time past middle life. Business men who have failed and then have had to take up book-keeping, gentlewomen who have been in good circumstances and have to take up needlework on the machine, army officers who have been on active service and then have to do much bureau or desk work;

people of these and similar classes are likely to suffer from painful conditions in the muscles of the back, especially the large group of muscles at the back of the neck and between the scapulæ. The discomfort often becomes so painful to them as to be unbearable. They may even have to give up their work.

In most of these cases there is distinct external evidence for the neurosis which is present in the occurrence of marked dermatographia. In many nervous people and in all who have any affection within the thorax, whether it be pulmonary or cardiac, the drawing of the finger-nail across the skin will give rise after a short interval to a red line somewhat persistent and sometimes raised slightly above the surface. In the people who complain of discomfort from the repetition of a muscle movement, this response to linear irritation is very marked and persistent. Letters may be made on the back, and they will be visible for from five to fifteen minutes after the irritation has been applied. This would seem to be an index of a similar condition existing in the capillary circulation in the muscles. The muscle does not empty itself well of blood since there is a lack of tone in the vasomotor mechanism and the consequence is a failure of circulation. In many of these people there is, besides, a rather exaggerated response to slight skin irritations. The wearing of a woolen shirt for the first time in the winter time, produces an appearance almost like erythema. In a word the vasomotor mechanism easily gets beyond control.

It must not be forgotten that the vasomotor mechanism throughout the body is not entirely reflex though it is involuntary. It does not always require sensory irritations at the periphery of the body to produce actions of the vasomotor system. The mind has a large power of control, or rather mental states affect very powerfully the vasomotor condition at the surface and beneath it. We shiver not alone from cold but also from fear. We grow hot not only from a temperature higher than our own, but from anger. There is a definite feeling of heat represented by a larger blood supply at the surface of the body than usual. Blushing is after all a vasomotor disturbance due to mental influences. It is easy to understand then that the attitude of mind of the patient toward a feeling of discomfort in a particular part of the body, the basis of which may be a vasomotor disturbance, is likely to emphasize that disturbance.

If the patient keeps thinking constantly of that part of the body and bothers about it then vasomotor tone and reaction are likely to be interfered with. This is what actually occurs, so that slight discomfort becomes emphasized into unbearable pain, though there is no new pathological condition developed but only a functional disturbance.

These vasomotor disturbances furnish the indications for treatment in these cases. The giving of salicylates or of coal-tar products will relieve the pain in certain acute stages, but as a rule do no good. They do not touch the underlying condition at all, and usually by depressive effects do harm rather than good. It is very common, however, to have these remedies given over long periods to such patients. It is a good rule to say better a useless remedy than none, but only on condition that the remedy is sure to produce no harm. We know too little about the coal-tar products to permit their use on this principle, and as regards the salicylates they are too irritating to the stomach and kidneys to be used to any extent. The first and most important thing is to get the patient's confidence, and then to give reassurance that this is not a rheumatic condition likely to develop further and involve more groups of muscles and so bring about helplessness. A dread of this kind of the advance of their rheumatism until they are crippled, as they have seen some others, exists in many of these patients' minds, and must be removed as the first essential to anything like improvement.

In many of these cases it will be found that patients are under weight. This is true not only for those whose family history would indicate that less weight than the average is normal for them, but also for many who should be well up to or above the normal in weight. In all of these cases it is important that the patient should be instructed to gain in weight. In some of the cases, as for instance in business men who have become book-keepers by necessity after a failure in business, or gentlewomen who, after family reverses, have had to become seamstresses, this is the most important part of the treatment.

In many nervous people, however, there is a definite tendency to undereat. So much is said about the harm that comes from over-eating that they are likely to reduce their diet and remove from it many elements that they need in order to keep up the

balance of their nutrition. When they reduce the amount of meat that they eat it has never seemed to me to make much difference. A reduction in the starches, however, always is likely to be followed by this nerve irritability, producing discomfort and pain in the nerves supplying the most used muscles in the body.

It is almost the rule for these people to reduce the amount of starches that they eat when they begin to worry over their diet. Potatoes are supposed to be indigestible and to produce gas and fermentation. Corn is supposed to be more or less indigestible, and then there is such a large residue of indigestible material associated with it, which they read about in the newspapers, that they get the idea that they should not take this; for some people bread is supposed to be likely to produce disturbances of digestion. These are the ordinary starches that people eat, and if they are much reduced the energy value of their food is seriously impaired. Of course they do not eat sweets, because they are terribly indigestible. The first thing to do with many of these people then, is to analyze their food rather carefully and put back into it the starches and fats that have so often been eliminated. Besides butter, there are two very useful fats that are thoroughly digestible for nearly everyone, olive oil and bacon, and these should be recommended as additions to the diet in order that the energy making value of the food taken may be increased.

It has become so much the rule to deprive nervous people of all the ordinary consolations of life, tea and coffee and tobacco and wine, whenever an attempt is made to remedy neurotic conditions that the subject must be discussed. When people are taking small amounts of these rather pleasant substances it does not seem well to deprive them of them. It is true that in some cases the deprivation acts as an excellent suggestive influence constantly reminding people that they must be getting better since they are denying themselves so much. When people are suggestive to a marked degree it may be well to forbid such beverages. Otherwise they should not be forbidden unless they are taken in excess and are seen to be doing positive harm. A small cup of coffee that is not strong, taken in the morning, is not only a consolation, but a stimulant to nervous people at the moment of the day when they most need stimulation. Weak tea does no harm as a rule, but the physician should assure

himself of the amount of tea and coffee that was being taken and then regulate it. Where but one or two cigars are smoked in the day they do no harm unless the patient is very susceptible. The missing of heart beats in connection with other neurotic symptoms, however, is usually an indication for the withdrawal of tobacco entirely. When but a small amount of wine or beer is taken at the largest meal of the day, and the patient has been accustomed to it for some time, its withdrawal is not advisable. Especially is this true when patients are under weight and when a definite effort is to be made to improve their nutrition. They usually eat better if allowed to continue the habit.

The most important modifications in the habit of the individual must come in the matter of the occupation. It is surprising with what poor judgment people sometimes continue to do things when a slight change of position at their work, of the chairs which they occupy, of the tables or desks at which they sit, would prove a great source of relief to their occupation neurosis. The same thing is true of the methods of using muscles. One would expect the people would have sufficient common sense to make certain changes in their occupations or their habitual methods of doing things when they found that these were associated with discomfort. As a rule, however, they have not connected the two things as closely as might be expected, and besides they have been running along with the idea that their discomfort was rheumatism and more or less inevitable, and so they have not put into effect certain simple precautions that would prove helpful. In this matter the physician can often be of great service.

The one drug that I have found effective in most of these cases is strychnine, which I prefer to give in the form of *nux vomica*. It has always seemed to me that the tonic effect of the *ignatia* bean is obtained much better through the tincture than through the alkaloid strychnine. I know that it is easy to be deceived in this matter, but after considerable observation I am much better satisfied with the tincture of *nux vomica* given in drop doses than with the tablet medication. One reason possibly is that it is easier to increase the dose of the tincture up to the physiological limit of tolerance and to suit the dose more accurately to the patient. The ordinary directions for the dosage of drugs takes small account of

the size of the patient, yet in the laboratory we are always careful to measure the dose of the drug to the body weight of the animal to which it is given. Something of the same thing is true for human beings, and it would be absurd to give a frail little woman weighing less than a hundred pounds a dose nearly the same as that prescribed for a man weighing considerably over 200. Of course in any such comparison fat does not count, for it is only an extra supply of nutrition carried round with the individual for times of scarcity. According to the weight of the frame, however, as it can be readily judged, the dose should be increased.

For most of these neurotic conditions, especially in the circulatory system, whether they affect the heart at one end or the capillaries at the other, *nux vomica* will be found a useful drug. When the heart is missing beats and doing its work irregularly it is almost invaluable, but nearly the same thing can be said of it when the capillaries fail to act properly and the vasomotor mechanism which rules them gets out of order. It is difficult to say just what should be the dose. I have always thought that too small doses were given. Some people give as low as five drops of *nux vomica*, and as this would be only two and one half minims it is entirely too small. Most people think that ten drops is a pretty good dose, but this is after all only five minims. To begin with in the ordinary person whose weight is 120 to 140 pounds at least fifteen drops (seven and a half minims) should be given, and this should be increased until fifteen minims (thirty drops) are being taken, three times a day. There is only one condition in which very small doses of *nux vomica* have in my experience done good, and that is in nauseated conditions of the stomach or in the persistent vomiting that sometimes accompanies certain neuroses or functional derangements of the stomach. In these cases drop doses of *nux vomica* in a teaspoonful of water, repeated every half hour or sometimes every fifteen minutes, will do more to relieve the condition than anything else.

For the neurotic conditions of the capillaries associated with vague discomfort consequent upon overuse, necessitated through occupation, the dose to begin with should be at least fifteen drops, and if the patient weighs 200 or more should be at least 25 drops. The dose should be increased one drop every second day until about fifteen additional drops are being taken, or until there is some feeling

of tension in the muscles. A dose somewhat less than what is necessary to produce this tense feeling should be continued for the next five or six weeks. In the meantime of course the general condition should be improved, the bowels must be regulated carefully, and sufficient rest must be taken. The *nux vomica* will both tend to increase the appetite and will tone up the intestinal system so as to lessen any tendency to constipation that may be present.

As to the discomfort complained of the ideal thing would be to have the patient change the occupation so as no longer to overuse the group of muscles affected. In most cases this is impossible, however. Directions should then be given with regard to a more rational use of the muscles in question. Writers must be taught that the table at which they write shall be so low and the chair so high that their elbow swings free of the table, so that according to Gower's rule if a second pen were fastened to the elbow it would write exactly the same thing as the pen held in the fingers. There must not be any movements for writing between the elbow and the fingers, but all should be accomplished from the shoulder. The pains are often in the shoulder, yet they will be found to be relieved by these directions, as was true in the case of this patient here. Patients who stoop over desks or at sewing must be asked to avoid the stooping posture if the discomfort complained of is in the muscles of the back or of the neck, and as a rule they will be able to accomplish much of their work without stooping. It is surprising how much of the stooping that the people think is unavoidable can be eliminated when they try to do so.

As for local measures I have nearly always found that they were a little worse than useless, since they called the patient's attention more and more to the affected part. Liniments should not be used, and special massage applied over the affected region has in my experience only emphasized the disturbance of the vasomotor mechanism which already exists in that region. Hydrotherapy for the benefit of the general condition has always done good. A douche should be given with the water producing no sensation of cold at the beginning and then gradually made somewhat colder. These patients should be given cold baths, but should be advised not to take them themselves. Cool douches when there is not much shock and a prompt reaction do good, but cold baths do harm. Applica-

tions of electricity to the affected part seem to act in the same way as local measures of treatment of other kinds and only direct the patient's attention to the symptoms already present in that part. These patients are often benefited apparently by electrical treatment and especially the high-frequency current, but that seems to be more because of the tonic effect of this and favorable expectation than because of the local action.

Many of these patients go the rounds of physicians for years. What they need above all is confidence and improvement of their general condition and distraction from their preoccupation with often a modification of the muscular activity which is called upon in their daily occupations. They need, however, to have the idea of rheumatism and its possible progressiveness thoroughly eradicated from their minds. This is one of the reasons why the osteopathic succeeds in relieving the symptoms of so many of them. He assures them that it is not rheumatism, but only a temporary subluxation of one of their vertebræ. He assures them that he can correct that, he gives them some general massage that is tonic in quality, he succeeds in creating an attitude of expectancy, in which case they eat better, he corrects constipation if it is present, and the result is cure in these cases. It is easy for the regular practitioner of medicine to accomplish the same results more easily and readily, and without the necessity for talking about any mythical subluxation of vertebræ which does not exist. What he needs in order to accomplish this is, above all, to give up the idea that a painful condition worse on rainy days is necessarily rheumatic, and to study his patient's occupation and individual nutrition a little more carefully, without any thought of the uric acid diathesis which is just as mythical as the subluxation of vertebræ of which our osteopathic friends make so much account.

Medicine

MIKULICZ'S DISEASE AND ALLIED CONDITIONS

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HISTORICAL.—In the ophthalmological literature of the latter part of the nineteenth century isolated enlargement of the lachrymal or salivary glands had been noted. Though Mikulicz first called attention to the condition which now bears his name on January 23, 1888, before the "Verein für Wissenschaftliche Heilkunde" at Königsberg,³ it was not until 1892 that he published in Billroth's Festschrift of the Beiträge zur klinische Chirurgie⁶ a detailed account. In the interim Haltenhoff⁴ (1889) reported a similar case without apparently knowing of Mikulicz's communication. This was shortly followed by a case report by Fuchs⁵ (1891). Subsequent writers, as Tietze,¹⁴ Kümmel,¹⁷ and Hirsch,⁵⁸ but especially Cheinisse,²⁹ claimed that the points emphasized by Mikulicz served to distinguish the condition from pseudoleukæmia and leukæmia, in either of which the same chronic painless enlargement of the lachrymal and salivary glands may occur. They claim, therefore, that the disease is a clinical entity and not a syndrome. The weight of evidence, however, is in favor of the contention that Mikulicz's disease is merely a clinical syndrome very much as are tetany, epilepsy, etc. For in the literature there are cases illustrating all stages of gradation between the strict Mikulicz type and the most characteristic leukæmia. Furthermore, some cases reported as Mikulicz's disease have later in their course been classified as pseudoleukæmia (Marcuse's case⁶⁸); and others considered pseudoleukæmia have before death proved to be very chronic cases of leukæmia (Stock's case⁶¹).

Mikulicz points out that involvement of the lachrymal glands alone was common (*e.g.*, Power,² Hähnle¹⁹ (2 cases), Pause²⁰

(Case I), Terrien,²¹ Stöwer,²² Rollet²⁶ (2 cases), and Shoemaker²⁸), and that such cases belong to his syndrome, for they are chronic symmetrical tumors of a benign character. Involvement of the parotid alone, which was unknown to Mikulicz, has been reported by Lafolley¹¹ (5 cases), Battle,¹⁸ Kümmel¹⁷ (Case V), Quincke,³⁴ Von Reuss,³⁷ Minelli,³⁸ and Apert.⁴² Again involvement of the submaxillaries alone has been reported by Kümmel (Case VI), while that of the sublinguals alone has occurred but once (Reinbach¹⁶). Involvement of one of the pair of glands has been reported in the parotid by Küttner¹⁵ (Cases I and II) and in the lachrymal by Berlin¹ (2 cases), Pause²⁰ (Case II), and Coppez.²³ Therefore one must admit that *latent forms* (*formes frustes*) may occur in this disease, just as in tetany and myxœdema, in which all the clinical phenomena are not present. We have accordingly in this paper included all cases of chronic painless symmetrical enlargement of the lachrymal or salivary glands either in whole or in part, not due to the ordinary tumor formation (as mixed tumors, carcinoma, and sarcoma), or such causes as tuberculosis, syphilis, actinomycosis, calculus, cysts, or sialodochitis fibrinosa. We have of course excluded all the acute inflammatory conditions such as may occur in mumps and other acute infections (typhoid, pneumonia, etc.), and those secondary inflammations following abdominal visceral disease or operations.

In this paper, for purposes of convenience, we shall group the cases under three heads; (1) Mikulicz's disease proper, (2) pseudo-leukæmia, and (3) leukæmia. After an enumeration of the reported cases we shall discuss the differential points of each clinical variety. Subsequently the syndrome as a whole, the pathological anatomy, the pathogenesis, the etiology, and finally the treatment will be taken up in turn.

MIKULICZ'S DISEASE PROPER

CASE I (*Berlin*,¹ 1870).—Male; æt. 35; no stigmata; left-sided exophthalmos for seventeen months; tumor of left lachrymal gland, firm and nodular, painless and not tender, slightly movable; no conjunctivitis; lymphatics and spleen not enlarged; excision; tumor extended into orbit between ocular muscles and consisted of fibrous connective tissue and small round cells with here and there remains of gland acini.

CASE II (*Ibid.*).—Female; æt. 15; tumor of right lachrymal gland, painless and slightly movable; slight exophthalmos; one pre-auricular gland en-

larged to size of pea; spleen not mentioned; excision; normal gland merging gradually into tumor consisting of fibrous connective tissue and small round cells separating lobules and terminal acini; no recurrence after five and a half years.

CASE III (*Power*,³ 1887).—Male; æt. 14; traumatism to head; swelling of lachrymals (especially left), which are painful and tender; lachrymation; condition of salivary glands, lymphatics, spleen, and blood not given; excised left gland revealed increase in fibrous tissue but little or no alteration of gland substance; no benefit from mercury and iodide; duration seven months.

CASE IV (*Haltenhoff*,⁴ 1889).—Female; æt. 12; no lues; follicular phlyctenular conjunctivitis for four months before swelling of lachrymals; both parotids and submaxillaries also enlarged; nasopharyngitis and hypertrophy of tonsils; no enlargement of sublingual and accessory salivary glands; no salivation or lachrymation; no enlargement of lymph-glands, liver, or spleen; leucocytes not counted; duration four months; improvement under potassium iodide and iron.

CASE V (*Fuchs*,⁵ 1891).—Male; æt. 61; no stigmata; first swelling of both lachrymals and four months later of both parotids; exophthalmos; tumor painless, firm, and irregular; other salivary glands and lymphatics unaffected; spleen, liver, and blood normal; excised portion of lachrymal revealed structure of lymphoma, viz., small and large nodules of lymphocytic cells; no epithelioid or giant cells; disappearance of acini; no benefit from arsenic; duration nineteen months.

CASE VI. (*Mikulicz*,⁶ 1892).—Male; æt. 42; conjunctivæ reddened and thickened; swelling of lachrymals first and later parotid, submaxillary, sublingual, and accessory salivary glands; lymphatics, liver, and spleen normal; blood showed no leucocytosis or other change; ptosis, slight salivation, dysarthria, and dysphagia; excision of lachrymals with recurrence; subsequent excision of lachrymals and submaxillaries with no recurrence; subsidence of remaining glands during terminal peritonitis; duration fourteen months. Tumors consisted of small and round-cell infiltration with normal gland acini except in the lachrymals, where the acini were difficult to find; no invasion of capsule.

CASE VII (*De Wecker and Masselon*,⁷ 1892).—Male; æt. 26; no stigmata; granular conjunctivitis; lachrymals first and later parotids swollen; tumors firm, irregular, and not tender; secretion normal; condition of other salivary glands, lymphatics, spleen, and blood not given; excised lachrymal gland gave diagnosis of epithelial tumor; improvement after eight months' duration. (Diagrams show round-cell infiltration with preservation of acini; no visible grounds for diagnosis of malignancy.)

CASE VIII (*Snell*,⁸ 1893).—Female; æt. 61; family history of tuberculosis; salivation and falling out of teeth several years before onset; swelling of right lachrymal and parotid and later of left lachrymal and parotid; xerostomia; in left eye an old retinochoroiditis; five years later slight swelling of sublingual and submaxillary glands; marked increase in size of lachrymal tumors; "breaking down of right parotid"; death from exhaustion five years after onset; lymph-glands, spleen, and blood not mentioned. No histological examination; no autopsy.

CASE IX (*Debierre*,⁹ 1893).—Male; æt. 27; no stigmata; first swelling of lachrymals, especially right, and later of parotids, especially left; tumors

firm, hard, painless, and immobile; difficulty in movement of lids and in mastication; lymphatics normal; conjunctivæ and nasopharynx normal; spleen, liver, and blood not mentioned; cure after three months' duration following potassium iodide and arsenic.

CASE X (*Bronner*,¹⁰ 1894).—Male; æt. 52; first tumor of lower lid, which was excised, but three years later recurred; smaller tumor in right lower lid; right submaxillary gland enlarged to size of small apple; also plum-sized tumor on hard palate; nine months later both upper and lower lids affected, but especially lower; excision of tumors from lower lids; no benefit from potassium iodide and mercury after months; cure after five weeks' use of arsenic; return of tumors upon discontinuing arsenic; histological examination of lid tumors reveals lymphocytic cells and fine connective-tissue trabeculæ, hence a lymphoma.

CASE XI (*Lafolley*,¹¹ 1894, Case VI).—Male; æt. 49; repeated attacks of rheumatism; slight atheroma; both parotids enlarged (especially left), smooth, and painless; mouth normal; claims that parotids always have been large and that same is true of father.

CASE XII (*Ibid.*, Case VII).—Male; æt. 38; recurring attacks of malaria for twelve years; for two years swelling of parotids with each attack; persistence of swelling after last attack four weeks before; examination reveals moderate enlargement, no tenderness or fluctuation; skin normal.

CASE XIII (*Ibid.*, Case IX).—Male; æt. 43; pulmonary emphysema for ten years; parotids enlarged, lobulated, soft, and painless.

CASE XIV (*Ibid.*, Case X).—Male; æt. 49; albuminuria; both parotids enlarged, soft, lobulated, and painless.

CASE XV (*Ibid.*, Case XI).—Male; æt. 68; bronchial asthma for fifteen years; both parotids slightly enlarged, soft, and painless.

CASE XVI (*Jayle*,¹² 1894).—Male; æt. 33; no stigmata; three to four days after extraction of teeth there was first swelling of right and later of left parotid at eighteenth year; reached present size in one year; submaxillaries also swollen; lachrymals and other salivary glands not affected; no enlargement of lymphatics; spleen and blood not mentioned; excision of portion revealed primary hypertrophy of glands; duration fifteen years.

CASE XVII (*Battle*,¹³ 1895).—Female; æt. 54; tuberculosis (?) of hip-joint at eleven years; no lues; xerostomia for three years prior to parotid swelling; extraction of teeth twelve months before; swelling of parotids with exacerbations; other salivary glands normal; lymphatics, spleen, liver, and blood not mentioned; atrophy of buccal mucous membrane; ducts patent exuding thick saliva; duration two years.

CASE XVIII (*Tietze*,¹⁴ 1896).—Male; æt. 39; no lues or tuberculosis; twelve years previously swelling of submaxillaries; four years later swelling of lachrymals with ptosis and difficult vision; lachrymals and all salivary and accessory salivary glands enlarged; conjunctivæ and nasal mucous membrane normal; lymphatics, liver, and spleen normal; no leukæmia (count not given); extirpation of lachrymal tumor revealed no gland tissue but everywhere lymphadenoid tissue consisting of giant cells, atypical round cells, and many eosinophiles; overgrowth of endothelium of capillaries; no tubercle bacilli. Fowler's solution gave no benefit. Reported again ten years later by Zondek¹⁵ marked increase in swelling of lids and exophthalmos; also increase in tumors of hard palate; still no blood change.

CASE XIX (*Küttner*,¹⁸ 1896).—Male; æt. 48; for ten years gradual and recently rapid increase in size of left submaxillary; tumor soft, size of peach, firm, and painless, without inflammatory signs; attachment to mucous membrane of mouth in one part; few small glands near angle of jaw; sublingual glands atrophied and contained small calculus; other glands uninvolved; liver, spleen, and blood not mentioned; excision; tumor adherent to environment through firm connective tissue; histological examination reveals for the most part preservation of gland tissue and round cell infiltration and increase of connective tissue, especially marked in certain areas where no glandular remains are to be found; accumulations of leucocytes around vessels and ducts; some inflammatory changes in neighboring glands; no bacteria found.

CASE XX (*Ibid.*, 1896).—Male; æt. 27; no stigmata; for six weeks a tumor of left submaxillary gland size of nut; no symptoms; recently rapid growth to size of apple with pain on mastication and deglutition; skin normal but adherent; tumor not tender, slightly movable; few lymphatics palpable near angle of jaw; no calculi; histological examination as above; in both cases boundaries of glands were broken through.

CASE XXI (*Ibid.*, 1896).—Female; æt. 18; following extraction of teeth four months before left parotid gradually enlarged to size of apple, no pain; skin normal; tumor firm, not tender; buccal mucous membrane normal except for slight swelling at opening of Steno's duct; no stone; one month later a fluctuating point at apex of tumor due to retention of saliva, which was overcome; no histological examination.

CASE XXII (*Reinbach*,¹⁹ 1897).—Male; æt. 10 months; breast fed; attacks of gastro-enteritis; chickenpox seven weeks ago, since which difficulty with tongue; four to six weeks ago appearance of lower central incisors; symmetrical sublingual tumor, size of 5-pfennig piece firm; smooth; excision with recurrence; second more extensive excision; histological examination revealed broader and longer epithelial cells than normal, which dipped into subepithelial tissue; numerous vascular spaces filled with red and white blood-cells; in some places typical round cell infiltration, with connective tissue and young vessels.

CASE XXIII (*Kümmel*,¹⁷ 1897).—Male; æt. 33; chronic hypertrophic rhinitis and asthma since childhood; enlargement of lachrymals and all salivary and accessory salivary glands; no involvement of lymphatics, spleen, or liver; blood negative; improvement under Fowler's solution with relapse following a fresh conjunctivitis and nasal catarrh; again improvement.

CASE XXIV (*Ibid.*).—Male; æt. 25; no stigmata; slight enlargement of lachrymals, salivary, and accessory salivary glands of two years' duration; physical examination except for slight acute pharyngitis otherwise negative. Improvement under arsenic.

CASE XXV (*Ibid.*).—Female; æt. 28; history of chlorosis, purpura, œdema of feet, and loss of all teeth; first left submaxillary and later all salivary and accessory salivary glands were swollen; lachrymals, lymphatics, spleen, and blood negative; history of influenza and pneumonia following subsidence of tumors but subsequent return; extirpated glands revealed substitution of gland by lymphadenoid tissue with round cells, eosinophiles, and giant cells; eight years' duration; no improvement under arsenic.

CASE XXVI (*Ibid.*).—Female; æt. 27; influenza three years before swelling of parotids and submaxillaries; lachrymals and other salivary glands normal;

spleen, lymphatics, and blood not mentioned; xerostomia with dysphagia and dysarthria; two years' duration.

CASE XXVII (*Ibid.*).—Male; æt. 47; arthritis deformans; swelling of parotids since boyhood; lachrymals, other salivary glands, lymphatics, spleen, and blood negative.

CASE XXVIII (*Ibid.*).—Female; æt. 23; slight struma; slight swelling of both submaxillary glands; lachrymal and other salivary glands, lymphatics, spleen, and blood normal; duration six months.

CASE XXIX (*Höhle*,²⁰ 1900).—Male; æt. 18; gradual swelling of lachrymals for three months; both lachrymals size of beans; follicular conjunctivitis; slight convergent strabismus; no lymphatic enlargement; salivary glands, spleen, liver, and blood not mentioned; excision of left gland; histological examination revealed hazel-nut tumor with thick capsule, round cell infiltration in some parts separating widely the acini, and in others completely replacing the latter; no definite giant cells, no tubercle bacilli; epithelial cells normal; no necrosis; case lost sight of.

CASE XXX (*Ibid.*, 1900).—Male; æt. 55; conjunctival irritation for two months; purulent discharge; tumors of both lachrymals, especially right; firm, elastic, and fairly movable; subcutaneous lymphoma in right hypogastrium; excision of right tumor and one month later of left; histological examination revealed replacement of normal gland by connective tissue and many round cells; epithelial cells normal; no recurrence after two years.

CASE XXXI (*Pause*,²¹ 1901).—Male; æt. 16; mentally deficient; lachrymal tumors for eight weeks with gradual increase in size; ptosis; tumors size of bean, firm, irregular, movable, and not tender; general examination negative; excision of both tumors; easily shelled out of capsule; histological examination revealed nowhere normal gland tissue; round cell infiltration and connective tissue; beginning necrosis (?) of fibrous portion; no giant cells or bacilli; no definite caseation.

CASE XXXII (*Ibid.*, 1901).—Female; æt. 28; pains in conjunctivæ; one month later swelling of right lachrymal gland; subsidence under local treatment; four months later return of tumor, which was size of bean, lobulated, and firm; excision; histological examination revealed same as above though in earlier stage; round cell infiltration and fibrous connective tissue; gland elements still maintained; no giant cells or tubercle bacilli.

CASE XXXIII (*Torrien*,²² 1901).—Female; æt. 18; no mumps; ptosis of right eye for two years; both lachrymals a little enlarged; no undue lachrymation; tonsils large; no general lymphatic enlargement.

CASE XXXIV (*Stöwer*,²³ 1901).—Male; æt. 14; no lues or tuberculosis; enlargement of both accessories and slightly of both main lachrymals; salivary gland, lymphatics, and spleen normal; blood not mentioned; conjunctivæ normal; negative to tuberculin; excision of both accessory glands revealed chronic inflammatory changes with round cell infiltration and disappearance of gland structure; giant cells and few epithelioid cells; occasional eosinophiles; no tubercle bacilli or bacteria; subsidence of glands under potassium iodide; duration seven months.

CASE XXXV (*Coppes*,²⁴ 1903).—Male; æt. 65; no stigmata; for one month swelling of right lachrymal gland with pain and tenderness; tumor lobulated, firm, movable; extended deeply into orbit and displaced eyeball downward

and inward; lymphatics normal; spleen, liver, and blood not mentioned; excision; histological examination revealed nut-sized tumor of lachrymal gland; acini partially atrophied and separated by fibrous tissue; many small round cells within acini; hence sclerosis following acute dacryoadenitis.

CASE XXXVI (*Baas*,²⁴ 1903).—Male; æt. 77; no stigmata; first right and then left lachrymal swollen; ptosis; accessory salivary and mucous glands of larynx enlarged; salivation, lachrymation, nasal discharge, hoarseness and dysphagia; other salivary glands, lymphatics, and spleen normal; blood not mentioned; duration fourteen months; excision of lachrymals, which showed slight invasion of capsule and increase in fibrous tissue, which was infiltrated with small round cells and plasma cells; lymph-nodes regular; fibroblasts resembling giant cells; glandular tissue scanty or absent; few mast cells; no eosinophiles, no bacteria (Wallenfang²⁵).

CASE XXXVII (*Rollet*,²⁶ 1904).—Male; æt. 50; bilateral tumors of lachrymal glands; also episcleral and retrobulbar lymphomata; conjunctivæ hyperæmic; tumors almond-shaped and mobile; no exophthalmos; slight hyperleucocytosis; salivary glands not mentioned; lymphatics and spleen normal; excision of right lachrymal; histological examination revealed fairly abundant reticulum and small round cells resembling lymph follicles; no recurrence twelve months later; left lachrymal unaltered.

CASE XXXVIII (*Shoemaker*,²⁷ 1904).—Female; æt. 19; colored; no lues; epidemic mumps two years previously; for five years swelling of both lachrymals, more or less painful at onset; possibly slight involvement of accessory glands of conjunctivæ; ptosis but no conjunctivitis or lachrymation; salivary and lymphatic glands and spleen not enlarged; hæmoglobin 67 per cent. red cells, 2,640,000, white cells, 6500, with slight lymphocytosis; not treated; duration five years.

CASE XXXIX (*Von Brunn*,²⁸ 1905).—Female; æt. 22; no stigmata; first right then left lachrymal and later both parotids swollen; submaxillaries palpable; accessory salivary glands, lymphatics, and spleen normal; blood not mentioned; xerostomia; duration twelve months; lost sight of.

CASE XL (*Ranzi*,²⁹ 1906).—Female; æt. 57; family history of tuberculosis; caries of finger at fifteenth year; pharyngeal catarrh for sixteen years; xerostomia for two and a half years; gradual painless swelling of right then of left parotid, later of both submaxillaries; lachrymals, other salivary and lymphatic glands, and spleen unaffected, red cells 4,700,000, white cells 5000; blood picture normal; excision of parotid revealed collections of lymph cells between widely-separated gland acini; no giant cells and no transformation of connective tissue or invasion of gland capsule; potassium iodide and arsenic for six weeks without benefit; six exposures of seven minutes each to Röntgen rays with temporary benefit; recurrence when not treated; duration three years.

CASE XLI (*Ziegler*,³⁰ 1906).—Female; æt. 18; colored; granular pharyngitis with adenoids and hypertrophied tonsils for years; lachrymals, parotids, and submaxillaries swollen; other salivary glands and lymphatics normal; spleen and blood not mentioned; slight ptosis; removal of tonsils and adenoids followed by subsidence of submaxillaries and later of parotids; no histological examination; duration six weeks.

CASE XLII (*Quinke*,³¹ 1906).—Male; æt. 45; history of a familial congenital chronic parotitis in father, two uncles, five brothers, and two sisters, all

of whom had more or less marked swelling of both parotids with peculiar facies; some in patient; no pain; during the course of an erysipelas there was marked diminution in the size of parotids but a return to former size six weeks after cure from erysipelas; no data as to other salivary glands; lymphatics, spleen, blood, etc.

CASE XLIII (*Zondek*,* 1906).—Male; æt. 27; no stigmata; swelling first of lachrymals and later of the parotids; peculiar facies; lymphatics and blood normal; no tenderness over bones; other salivary glands, spleen and liver not mentioned; two courses of arsenic caused no benefit, hence given up; spontaneous subsidence and later a recrudescence and again subsidence in size of glands; duration fifteen months.

CASE XLIV (*Haenisch*,* 1906).—Female; æt. 37; cough and coryza two months before onset; swelling of lachrymals, parotids, and buccal glands; no pain or tenderness; stupid facies; xerostomia; sublinguals hard but not enlarged; submaxillaries normal; lymphatics and blood not mentioned; liver and spleen normal; seven exposures to X-rays; marked improvement in four weeks and cure by eight months; no recurrence two months later; duration eleven months; no histological examination.

CASE XLV (*Von Reuss*,* 1906).—Female; æt. 5½; no mumps; for three and a half years gradual swelling of both parotids; synchronous with cold weather, sore throat and nasopharyngeal catarrh and increase in one or both parotids with pain and fever; some enlargement always present to about size of nut; tumors are sharply limited, nodular, and painless; no change in Steno's duct; other salivary glands and lachrymals normal; adenoids and slight tonsillar hypertrophy; liver, spleen, and blood normal.

CASE XLVI (*Minelli*,* 1906).—Female; æt. 26; for six years swelling of both parotids; at first slightly painful, recently more so; hard and tender; lachrymal, submaxillary, and sublingual glands normal; lymphatics and blood normal; excision of left parotid, which was size of goose egg and hard; histological examination showed localized and generalized lymphocytic cells and increase in fibrous tissue; for most part gland acini are lost; in places distinct lymph-nodules; numerous capillaries; hemorrhagic exudate; fibroblasts in periphery of lymphocytic foci, where also eosinophiles are very numerous; giant cells; no necrosis.

CASE XLVII (*Napp*,* 1907).—Female; æt. 27; husband tuberculous; no lues; three months ago swelling of parotids and submaxillaries, later of lachrymals, etc.; enlargement of parotids to size of date, submaxillaries to walnut, lachrymals to pea, buccal glands to millet seed or even pea; many nodules in both bulbar and palpebral conjunctivæ; spleen and lymphatics normal; Hb. 100 per cent.; R.C. 5,100,000, W.C. 9000, P.N. 86 per cent., E. 2 per cent., Mz. 1 per cent., Ly. 3 per cent., L.Ly. 5 per cent., L.Mono. 5 per cent.; no erythroblasts; no luetic stigmata; apical catarrh; night sweats; excision of palpebral conjunctivæ, which revealed nodules resembling miliary tubercles consisting of epithelioid cells, giant cells surrounded by lymphocytes; some central necrosis; tubercle bacilli found, three to four in a nodule; round cell infiltration is slight.

CASE XLVIII (*Gutmann*,* 1907).—Male; æt. 27; primary sore and secondary roseola in 1903; four mercury cures; in 1906 burning of conjunctivæ and swelling of parotids; lachrymals swollen; redness and swelling of follicles of conjunctivæ with secretion of mucus; parotids, submaxillaries, and sublinguals

enlarged; lymphatics and spleen not mentioned; Hb. 80 per cent., R.C. 5,400,000, W.C. 6000, P.N. 62 per cent., E. 4 per cent., Ly. 32 per cent., Mono. 2 per cent.; red cells normal; cure after use of potassium iodide for three months.

CASE XLIX (*De Jong and Joseph*,^a 1908).—Male; æt. 15; father died of tuberculosis; fifteen out of twenty-one brothers and sisters died in infancy; infantilism; no tuberculosis; for eighteen months gradual swelling of parotids, etc.; parotids large, hard and lobulated; submaxillaries size of small nut and slightly indurated; sublinguals enlarged; no pain or salivation; saliva normal; lachrymals and accessory glands normal; slight injection of conjunctivæ; spleen and lymphatics normal; heart hypertrophied; thyroid gland enlarged; no sign of myxœdema; Hb. 70 per cent., R.C. 4,080,000, W.C. 6000, P.N. 63 per cent., E. 1 per cent., Ly. 9 per cent. Trans. and large Mono. 27 per cent.; no abnormal cells; iridochoroiditis and nodules in iris developed synchronously with tumors of parotid and not considered luetic.

CASE L (*Apert*,^a 1908).—Male; æt. 66; infantilism; hypothyroidism; glycosuria; parotids much enlarged, soft, and mobile; marked hypertrophy of mammae.

CASE LI (*Külbs*,^a 1908).—Male; æt. 21; no lues; acute onset with swelling of parotids and pain on swallowing but no fever; (mumps?); both parotids and submaxillaries enlarged and slightly tender seven weeks after onset; lachrymals enlarged and secretion diminished; accessory salivary glands, lymphatics, spleen, and liver normal; Hb. 100 per cent., R.C. 4400, W.C. 7200; blood picture normal (no details); under potassium iodide and mercury gradual diminution in glands in six months; vesical calculus; lysol poisoning (suicidal); death; autopsy; salivary and lachrymals show increase in size and weight; microscopically all show lymphocytes in small groups or rows or even in follicular collections; acini are normal in part or showing destruction of nuclei and protoplasm from lymphocytic infiltration; giant cells; marked connective-tissue increase, especially in parotids but less so in sublingual and submaxillary glands, and not at all in lachrymals; marked vascularization; no central necrosis, tubercle bacilli, or micrococci; all lymphatics normal with exception of one from anterior cervical region (inflammatory) from diseased tonsil; liver, spleen, glands at root of tongue, and testicles normal; hence chronic inflammation of lachrymal and salivary glands.

CASE LII (*Author's Case I*).—Mikulicz's disease. E. L. M.; æt. 31; physician; consulted Dr. Osler, February, 1900. Complaints: "Swelling of the parotid glands." Family history negative for tuberculosis, etc. Personal history: He had "rheumatism" when 14 years old, and "malaria" four or five times. He never used alcohol. He denied venereal disease or even exposure to it. His general health had always been good and he never had any disease of the liver, spleen, kidneys, or gastro-intestinal tract. Present illness began in December, 1899, with enlargement of both lachrymal glands, which caused swelling of the eyelids. Next the parotid glands became swollen but without pain or evidence of

suppuration. There was difficulty in opening the mouth, and marked disfigurement. The size of the glands could not be increased by blowing. Later there was enlargement of both submaxillary and sublingual glands and also a "gland in the cheek." The general health remained good except for some anorexia and gastric irritation. He had consulted various physicians and received various diagnoses. Dr. Osler recommended the alternate use of potassium iodide and arsenic. He was unable to take the former but continued the arsenic for a period of eight months, at the expiration of which time the patient stated he was entirely cured. In a letter to the author dated August, 1907, he stated that he was enjoying perfect health and there was no return of the enlargement of the salivary glands.

CASE LIII (*Author's Case II*).—Chronic parotitis; latent Mikulicz's disease; cirrhosis of the liver (?). A. B.; male; white; American; single; age 42; laborer. Med. No. 18014. Admitted to the Johns Hopkins Hospital January 20, 1905. Complaints: "Pain in upper part of stomach; stiffness and soreness of leg." Family history negative.

Personal History.—At three he had smallpox. As a child he also had mumps, but no other important acute infection. He had chills and fever at 20; he denied tripper; at 23 he had a venereal sore with bubo but no history of secondaries; since the age of 18 he had drunk beer and whisky to great excess.

Present Illness.—Sixteen years before admission he was laid up for two or three months on account of "hard liver." There was also a history of frequent vomiting, indigestion, and loss of weight. Three or four years before admission swellings appeared at the angle of the jaw on each side; they varied much in size, were not painful, and caused him little trouble. On January 20: hæmoglobin, 108 per cent. (von Fleischl); R.B.C., 4,190,000; W.B.C., 6,900; there were no malarial parasites present; no poikilocytes. On January 21, I noted that he was a florid, well-nourished man; distinct enlargement of the superficial veins over cheek; suffusion of conjunctivæ; there was marked fulness over the parotid region, especially on right, but no tenderness or induration. This swelling was due to enlargement of parotid glands, the lobules of which were indefinitely felt. The liver was enlarged and firm, somewhat rough and

irregular; spleen was not felt; the lymphatic glands were not enlarged. On January 23, Dr. Osler noted: The parotids of both sides uniformly enlarged, not tender; outlines of the glands can be readily traced. The urine showed always a trace of albumin; the specific gravity was 1005 to 1020; occasionally a few hyaline casts were found; temperature normal. No potassium iodide given. Patient discharged on February 3, much improved.

CASE LIV (*Author's Case III*).—Chronic parotitis (latent Mikulicz's disease); amœbic dysentery; *Lambliã intestinalis*. W.M.A.; male; colored; married; age 44; cook; admitted to the Johns Hopkins Hospital February 5, 1905. Med. No. 18057. Complaint: "Weakness and loss of weight." Family history negative. Personal history: He had measles, mumps, and whooping cough in childhood and malaria in 1901. He had always been troubled with diarrhœa, often with four stools per day; he denied lues and tripper but gave a strong alcoholic history, chiefly of whisky. Present illness began in October, 1904, with weakness, diarrhœa, loss in weight and strength, and œdema of legs. Examination on February 6: Dr. Fitcher noted distinct puffiness of eyelids and legs; discrete patches of brownish pigmentation on lower extremities; no definite purpura. There was also distinct fulness over both parotid regions in front and below lobes of both ears, and the parotid gland was readily outlined on either side; there was also increase of pigmentation in the axillæ and areolæ; there was no enlargement of the liver or spleen; the condition of the lymphatic glands was not stated; the thyroid gland was normal. R.B.C., 4,392,000; hæmoglobin, 70 per cent.; W.B.C., 5,100. On February 9 the stools showed encysted forms of *Lambliã intestinalis*; repeated examinations of blood were negative for parasites. On February 10 the blood showed hæmoglobin, 60 per cent.; R.B.C., 3,400,000; W.B.C., 5,100; P.N., 70.7 per cent.; Sm. Ly., 23.4 per cent.; L.M., 3.70 per cent.; E., 1.48 per cent.; trans., 0.57 per cent. On February 17, Hb., 75 per cent.; R.B.C., 4,004,000; W.B.C., 6,500; P.N., 73 per cent.; Sm. Ly., 21.4 per cent.; L.M., 2.9 per cent.; E., 0.77 per cent.; trans., 1.75 per cent. On February 18, forms of the *Lambliã intestinalis* were again found, as well as a few small amœbæ, actively motile. *Cercomonas* and *trichomonas* were also present. On February 27 the patient com-

plained of pain in the left ear. On March 28 the patient's condition was much improved. There was still fulness over both parotid glands, especially the left, the lobules of which could be readily felt. The urine on admission contained a faint trace of albumin; otherwise negative. He had a little fever at first, which afterwards disappeared.

CASE LV (*Author's Case IV*).—Chronic inflammation of lachrymal and parotid glands (latent Mikulicz's disease); alcoholic peripheral neuritis; cirrhosis of liver. C. E.; male; German; married; age 23; bar-keeper. Med. No. 18,327. Admitted to the Johns Hopkins Hospital, Baltimore, April 14, 1905. Complaint: "Numbness in the legs." Family history negative. Personal history: He had no acute infections except measles at seven; at the age of five it was first noticed that his eyes were abnormally prominent, even more so than at present; there was no pain and no visual disturbance until the age of nine, when his eyes became weak and he began the use of glasses. He attributed his eye trouble to living at a high altitude. He had used both beer and whisky to excess for years. Present illness: First symptoms of the peripheral neuritis on April 7, since which time patient had been able to walk, but exercise caused him severe pain. On admission, hæmoglobin, 80 per cent. (Dare); R.B.C., 5,200,000; W.B.C., 11,180. Physical examination revealed a plethoric individual, with enlarged abdomen due to an enlarged liver, which was firm and hard; the spleen was not felt; the condition of the lymphatic glands was not stated. On April 17 Dr. Thayer noted that there was remarkable droop of the upper eyelids, with distinct prominence in each outer half; this was associated with a small nodule 7-8 mm. in diameter. On the right, where the swelling was a little greater, there seemed to be a number of connected nodules. On either side the outline of the lachrymal duct was prominent and swollen; there was little lachrymation in the right eye. On April 24 Dr. Osler noted that the parotid glands were enlarged and palpable but the buccal glands were not enlarged. On April 25 the lachrymal and parotid glands were still enlarged and practically unaltered. He was discharged very much improved; there was still evidence of neuritis of both hands and feet. The urine was repeatedly negative; the temperature normal. Potassium iodide was given in increasing doses without apparent effect.

Rejected Cases.—The following cases were examples of simple lymphomata of the eyelids or orbital tissue without enlargement of the lachrymal or salivary glands, and hence are not included in my paper, viz.: Schirmer," Arnold and Becker," Gayet," Silcock," St. Bernheimer," de Wecker," Westhof," and Rollet" (Case I). Mikulicz's claim that Arnold and Becker's case was a simple lymphoma of the lachrymal gland cannot be accepted. Lafolley's " Cases I, II, III, IV, V, and VIII were rejected as being examples of toxic or lead parotitis.

From the study of the above fifty-five cases we see that the simple form occurs for the most part in adults between 20 and 60 years of age, though no decade is exempt. Males are more frequently attacked than females. There is first a gradual symmetrical enlargement of the lachrymal glands resulting in ptosis and exophthalmos with, at the most, mechanical interference with vision. Usually lachrymation is an early symptom. Sooner or later there is involvement of the parotid, submaxillary, and sublingual salivary glands. In some cases there is also enlargement of the secondary salivary glands of the hard palate, of the under surface of the tip of the tongue (Blandin-Nuhn glands), and of the lateral aspect of the posterior portion of the tongue (Weber's glands). This gives rise to a peculiar stupid facies, easy of recognition but difficult of description. As we have already remarked, all cases do not present this complete picture, but show all stages from complete involvement of all the above-mentioned glands to enlargement of one gland alone. These tumors are firm, smooth, painless, free from tenderness, and are usually not adherent to the surrounding tissues. The lachrymals are as a rule, though not invariably (*e.g.*, Tietze's case), first involved; later the salivary and buccal glands become affected. Cheinisse laid great stress on this point. Further, neither the neighboring nor the distant lymphatic glands are involved; the spleen too is not enlarged. The blood-picture remains quite normal for years. That subsequent involvement of the hæmatopoietic system does occur is well illustrated by Marcuse's case.

There is no fever or malaise and the only disturbance that the patient may experience is from a mechanical interference with the act of mastication or deglutition (due in part to the dryness of the mouth) and the movement of the eyelids and eyeballs. In addition to this there is of course the æsthetic embarrassment of the unsightly disfigurement.

The function of the glands may or may not be deranged. Some

cases of excessive secretion of the lachrymal (*e.g.*, Power, Baas) or salivary glands (*e.g.*, Mikulicz, Baas) are on record. More commonly is there absence or diminution of the salivary secretion resulting in xerostomia (*e.g.*, Snell, Battle, Kümmel (Case IV), Von Brunn, Ranzi). Pre-existing or co-existing conjunctivitis has also been noted (Haltenhoff, Mikulicz, de Wecker and Masselon, Kümmel, Case I). On the other hand pharyngitis is relatively rare (Kümmel's Case II, Ziegler). Enlargement of the tonsils and hypertrophied adenoids (Ziegler) are not as frequent here as in the second group of cases. Such a condition of affairs may last for years, but may yield to treatment or subside of its own accord, or what is of special interest may temporarily subside during the course of an acute febrile disturbance or general infection such as general peritonitis (Mikulicz), pneumonia (Kümmel, Case III), erysipelas (Quincke). This fact is a still further link in the relationship of this condition and leukæmia, in which it is well recognized that there may be a betterment in the size of the lymph-glands and spleen, and in the blood-picture during an acute infection.

Even though the enlargement of the glands persists there is little tendency to shorten life. Snell's case (which may have been a lymphosarcoma) is the only one on record in which death was thought to be due to the glandular condition; but here no autopsy was made.

After complete extirpation of an affected gland there is no tendency to recurrence—a point emphasized by Kümmel and Axenfeld as further differentiating Mikulicz's disease from pseudo-leukæmia and lymphosarcoma.

PSEUDOLEUKÆMIA

The following abstracts show the important features of twenty reported cases belonging to this group:

CASE I (*Reymond*,²¹ 1883).—Male; æt. 57; no lues; malaria at 20; tripper at 22; symmetrical tumors of lachrymals and parotids; cervical and axillary lymph-glands and spleen enlarged; blood not examined; extirpated lachrymal gland revealed lymph cells in a reticular stroma with central amyloid degeneration in follicles; remaining tumors decreased under potassium iodide; duration two years.

CASE II (*Adler*,²² 1889).—Male; æt. 70; no lues, but previously had pneumonia and dysentery; first lachrymals swollen, cartilaginous, mobile, and painless; later cartilaginous tumors of hard palate and pharynx; no exophthalmos;

nodules of conjunctivæ; salivary glands normal; nine months later neighboring lymphatics enlarged; spleen not mentioned; histological examination of nodules from conjunctivæ revealed "small-celled sarcoma"; Fowler's solution followed by disappearance of tumors; duration four and a half years.

CASE III (*Æxenfeld*,²³ 1891).—Male; æt. 62; brother dead from myelogenous leukæmia; exempted from military service on account of scrofula; influenza was followed by eye symptoms, exophthalmos, etc., due to thickening of all four eyelids and subconjunctival nodules, one of which was in left lachrymal region; ptosis; parotids and submaxillaries hard and thickened; tumor in buccal mucous membrane; lymphatics in neck and groin enlarged; spleen and liver normal; blood repeatedly normal except for slight increase in white cells; xerostomia; buccal and pharyngeal mucous membrane dry, thickened, and red, resembling rhinoscleroma; tonsils hypertrophied; nasal obstruction; dysphagia; intercurrent nephritis; tumors from conjunctivæ and lachrymal gland on histological examination revealed many small round cells in alveolar-like collections with fair connective-tissue capsule; no tubercle bacilli or necrosis; numerous old and recent hemorrhages; lachrymal tumor is in no way connected with gland substance and resembles a lymphadenoma.

CASE IV (*Zirm*,²⁴ 1891).—Female; æt. 30; no lues; first parotids and later lachrymals enlarged; other salivary glands normal; general lymphatics enlarged; spleen and liver normal; no tenderness over bones; hæmoglobin 85 per cent., red cells 5,100,000, white cells 7000; smears negative; double ptosis, diplopia, and limitation of motion of eyes; extirpation of left parotid and lachrymal followed by erysipelas with diminution in size of remaining glands; gradual relapse; histological examination revealed "granulation tissue," partly general and partly arranged in nodules, so that occasional areas of gland tissue were visible; many lymphoid cells; central necrosis of some nodules; conversion to fibrous tissue; gland endothelium normal; hyaline degeneration; no giant cells and no tubercle bacilli.

CASE V (*Sandford*,²⁵ 1893).—Male; æt. 56; no lues; symmetrical orbital tumors in direct continuity with lachrymal glands; right eye completely and left almost closed; submaxillary and temporal lymphatics enlarged; salivary glands, liver, spleen, and blood not mentioned; duration one year; excision; no recurrence after two years; histological examination revealed adenomata with small-cell proliferation.

CASE VI (*Panas*,²⁶ 1894).—Male; æt. 70; lymphomata of both lachrymals; salivary glands normal; no increase of leucocytes; few lymph-glands enlarged. Histological examination revealed that the connective tissue of lachrymals was widely infiltrated with lymphocytes and the glandular elements retained.

CASE VII (*Basel Hospital Reports*,²⁷ 1897).—Male; æt. 17; for four years swelling of both parotids, which were firm, mobile, and covered by normal skin; smaller each summer; anterior cervical lymphatics enlarged to size of bean; other salivary glands, spleen, liver, and blood not mentioned; excision; not affected by mercury or potassium iodide.

CASE VIII (*Hirsch*,²⁸ 1898).—Male; æt. 30; no lues; acute onset with swelling of parotids, and three weeks later of lachrymals, submaxillaries, accessory parotid, and sublingual glands; accessory salivary glands of mouth and palate normal; no pain or fever; peculiar facies; dryness and redness of conjunctivæ and mouth; saliva normal; lymphatic glands enlarged; liver and spleen normal;

pancreas not felt; hæmoglobin 80 per cent., red cells 4,200,000, white cells 8000; blood picture repeatedly normal; no reaction to tuberculin; excised left submaxillary gland revealed direct transformation of round-cell infiltration to new-formed connective tissue and active degeneration of gland parenchyma; presence of "conglutination giant cells"; no tubercle bacilli or other organisms. No benefit from mercury. Recovery under potassium iodide after twelve months' duration.

CASE IX (*Oster*,²⁰ 1898).—Female; æt. 11; colored; enlargement of lachrymals, parotids, submaxillaries, sublinguals, and accessory salivary glands of mouth; tonsils swollen; slight general lymphatic enlargement; spleen enlarged (malaria?); liver normal; several blood examinations revealed no anæmia, but slight leucocytosis (10,300); ulcerative rhinitis considered luetic at first, though no other stigmata present; sixteen months after onset there was a gradual subsidence of the glandular swelling following acute pleurisy with effusion, until by seventeenth month there was complete disappearance; death three years later from pulmonary tuberculosis; at autopsy the lachrymal glands were represented by a fibrous structure and there was no evidence of enlargement of any of the salivary glands.

CASE X (*Fleischer*,²⁰ 1902).—Female; æt. 10; two years before some unknown "eye-trouble"; first lachrymals, then parotids, sublinguals, and submaxillaries (slightly) enlarged; soft palate swollen, roughened, and slightly reddened; tonsils slightly enlarged; conjunctivæ red and injected and contained numerous pin-head excrescences; no lachrymation; slight general lymphatic enlargement; spleen enlarged; liver normal; blood examination normal; slight bronchitis; general condition good; excised conjunctivæ revealed sharply limited tumors with connective-tissue capsule containing little discrete or confluent nodules of epithelioid cells and few giant cells; slight round-cell infiltration; no vascularization; no caseation; few remains of intact gland cells; smear and cultural tests negative for tubercle bacilli, etc.; potassium iodide and tonic treatment caused improvement in four months; duration seventeen months.

CASE XI (*Hæckel*,²¹ 1903).—Male; æt. 21; traumatism with displacement of left kidney three months previously; no lues; lachrymals, parotids, and submaxillary glands enlarged; sublinguals and accessory salivary glands and lymphatics not enlarged; injection of conjunctivæ with lachrymation; spleen not enlarged; blood examination normal; ulcerative enteritis with subsidence of glands; multiple cutaneous tumors size of bean over head and back; return of lachrymal and salivary tumors; acute bronchitis with bloody sputum; return of enteritis with œdema and purpura and a second subsidence of glands; death; autopsy revealed an enlarged spleen with visceral hemorrhages and an ulcerative enteritis; lachrymals, parotids, and submaxillaries enlarged, firm, and grayish-white on section; increase of fibrous tissue but glandular elements still recognizable; tissues, especially round-cell infiltration, as a rule not invading glandular zone, but in some areas no gland structure exists and in others a beginning degeneration of gland epithelium occurs; no bacteria; skin tumors show round-cell infiltration; spleen, liver, and pancreas normal.

CASE XII (*Outler*,²² 1904).—Female; æt. 20; colored; no lues; first swelling of parotids, later of lachrymals and submaxillary glands; other salivary glands not mentioned except that mouth was normal; slight general lymphatic

enlargement; liver and spleen not enlarged; blood revealed hæmoglobin 90-70 per cent., R.C. 4,350,000 to 4,730,000, W.C. 5200 to 5900, P.N. 89-65 per cent., L.M. 15-18.5 per cent., Ly. 22.0-7.5 per cent., E. 0.0-3.0 per cent., Mx. 2.7-1.5 per cent., Trans. 1.0-4.0 per cent.; nodular iritis; mercury, iodides, and X-ray treatment caused no benefit; arsenic, however, caused very marked improvement after twelve months' duration.

CASE XIII (Marcuse,²² 1904).—Male; æt. 11; characteristic facies due to enlargement of lachrymals, parotid, submaxillary, sublingual, and accessory salivary glands; conjunctivæ red and injected, with diminution of secretion; saliva normal in amount but altered qualitatively; buccal mucous membrane dry, deep red, and lacquered; lymphatic glands, spleen, liver, and pancreas (no glycosuria) normal; Hb. 85 per cent., R.C. 5,000,000, W.C. 7000, P.N. 63 per cent.; Ly. 24 per cent.; L.M. 8 per cent., E. 6 per cent.; considered at first after three months' duration as Mikulicz's disease; subsequent history (one year later) revealed lymphatic glandular enlargement, cachexia, cardiac symptoms of failure of compensation; Hb. 85 per cent., R.C. 4,800,000, W.C. 7000, P.N. 42 per cent., Ly. 42 per cent., E. 16 per cent.; death eighteen months after onset; autopsy; cor bovinum from pressure on large vessels by enlarged mediastinal glands; parotid gland revealed atrophy from replacement of gland parenchyma by new connective tissue; lymph-glands revealed pure hyperplasia; no tubercular changes.

CASE XIV (Van Duyse,²³ 1905).—Male; æt. 67; no lues; first swelling of left then six months later of right lachrymal and submaxillaries; intercurrent pneumonia (before admission); lachrymals, parotids, submaxillaries, sublingual, and buccal glands enlarged; slight ptosis; superficial and mediastinal lymphatics enlarged; spleen enlarged; liver normal; Hb. (?), R.C. 3,850,000, W.C. 8600, P.N. 73 per cent., Ly. 7 per cent., L.M. 18 per cent., E. 2 per cent., My. 0; four X-ray treatments with slight benefit; sudden death fourteen months after onset; autopsy; serofibrinous pleurisy; lymphoid plaques of pericardium; liver, thyroid, and bone-marrow normal; spleen enlarged; no histological examination of salivary glands.

CASE XV (Von Brunn,²⁴ 1905).—Female; æt. 4½; no lues; swelling of lachrymals, parotids, submaxillaries, and sublinguals; accessory salivary glands normal; general lymphatic enlargement; spleen normal; conjunctivæ of upper lids are swollen and contain granulations; ptosis; infiltration of skin and periosteum of bones; blood examined repeatedly; Hb. 40-30 per cent., R.C. 2,750,000 to 1,900,000, Index 1.1-0.95 per cent., W.C. 2800 to 1800, P.N. 44.5-29.7 per cent., Ly. 65.6-42 per cent., L.Ly. 1.7-10.7 per cent., Trans. 2.0-5.6 per cent., L.Mono. 0.3-10.4 per cent., E. 0, Mx. 0; occasional normoblast; few megaloblasts in two counts; 1-2 myelocytes also present in one count; hence "pseudoleukæmia" of lymphatic type with aplasia of bone-marrow; irregular fever; temporary improvement of glands under X-rays; death six months after onset; no autopsy; histological examination of excised lachrymal showed increase in connective tissue with lymphocytic infiltration; gland acini well preserved and not degenerated; no giant cells; no mitosis; lymphatic glands showed pure hyperplasia without connective-tissue growth or evidence of tuberculosis.

CASE XVI (Meller,²⁵ 1906).—Female; æt. 58; first swelling of right parotid region, then one and a half years later in right lachrymal, then left lachrymal; no definite enlargement of parotid, submaxillary, or other salivary glands;

definite enlargement of accessory lachrymal gland and of Krause's glands in both upper lids; tumors in both lower lids in connection with lachrymals; general lymphatic enlargement in neck, axilla, and groin, also in parotid and submaxillary regions; spleen and liver enlarged; no increase of leucocytes in fresh blood; deafness in right ear, nasal obstruction and dryness of mouth; tenderness over bones; excision of right and left accessory lachrymals and Krause's glands revealed primary adenoid growth between acini, which here and there were distorted and degenerating; in areas where process was advanced there were multiple lymph-nodes limited sharply from connective tissue; no invasion of acini or gland capsule.

CASE XVII (*Ibid.*, 1906).—Female; æt. 5; lupus vulgaris fourteen days after birth; inflammation of eye since measles three years before; no other tuberculous stigmata; first swelling of lachrymals and later both parotids and both submaxillary salivary glands; conjunctivæ normal; redness of palate and slight enlargement of right tonsil; submaxillary lymphatics enlarged but clavicular and axillary not enlarged; spleen and liver not mentioned; no blood count; after one year's treatment tumors had completely disappeared except for hard scar in left lachrymal region; author considers it a chronic inflammation of affected glands engrafted on a tuberculous basis; no histological examination.

CASE XVIII (*Pfeiffer*,²⁷ 1906).—Male; æt. 10; no stigmata; first swelling of lachrymals, then of parotids, submaxillaries, sublinguals, and Blandin-Nuhn's glands; peculiar facies; conjunctivæ red and studded with nodules; no lachrymal secretion; buccal mucous membrane deep red and dry; no salivary secretion; no adenoids; general lymphatic enlargement; liver and spleen normal; no tenderness over long bones; Hb. 90-95 per cent., R.C. 4,808,000, W.C. 10,000; blood picture at first normal; excised right submaxillary showed in periphery the acini squeezed together by round cells and conglomerate cells, while centrally the acini were replaced by young granulation connective tissue; X-ray treatment with marked improvement in size of lachrymal, salivary, and some of lymphatic glands; blood six months later showed Hb. 95 per cent.; R.C. 4,384,000, W.C. 11,600, P.N. 58 per cent., S.Ly. 21 per cent., L.Ly. 13 per cent., Trans. 1.3 per cent., Mz. 1.5 per cent., E. 13.5 per cent.; no nucleated reds; left submaxillary excised after treatment showed almost complete disappearance of round cells between the acini with increase in the connective tissue without change in glandular epithelium; marked improvement after nine months' duration.

CASE XIX (*Snegireff*,²⁸ 1906).—Female; æt. 39; no lues; for nine years recurrent exophthalmos with menses; constant exophthalmos for four years; eczematous rash for four years; lachrymals, submaxillary, and accessory parotid glands swollen; localized infiltration of lids and orbit; general lymphatic enlargement; liver and spleen at first normal; conjunctivæ hyperæmic; throat and nasopharynx normal; Hb. 85 per cent., R.C. 5,000,000, W.C. 7200; normal ratio of white cells; six months later marked enlargement of liver and spleen; excised lachrymal, orbital, and submaxillary tumors revealed proliferation of interstitial tissue cells (cirrhotic changes); follicular collections of lymphocytic round cells; end process also seen as shown by sclerosis and replacement of gland by connective tissue; no change in vessels except for occasional hyaline degeneration; no giant cells; no bacteria; arsenic and iodide caused no improvement of glands; ung. hydrargyri caused lessening of exophthalmos; duration four and a half years.

CASE XX (Dunn,* 1907).—Female; colored; æt. 13; mumps four months ago; first enlargement of lachrymals, later of parotids, submaxillary, and sublingual glands; no pain or tenderness; no lachrymal or salivary secretion; xerostomia and thirst; general lymphatics enlarged; spleen and liver normal; blood showed simple anæmia and a ratio of white to red cells of 1:500; otherwise negative; mammae normal; no benefit from mercury, potassium iodide, or arsenic; twenty-two months after onset a long "febrile attack" of one year's duration without diminution in affected glands; voice hoarse and weak; luetic (?) infiltration of nasal septum; no evidence of tuberculosis; skin eruption over face leaving scars; three and a half years after onset general condition good, no lymphatic enlargement and parotids atrophied; submaxillaries and sublinguals still hard and large.

Rejected Cases.—(1) The following cases, viz., Guiata,¹⁰ Boerma,¹¹ Berl,¹² Hochheim,¹³ and Goldzieher¹⁴ were not included because the pseudoleukæmic process only affected the eyelids or the orbital tissue; the lachrymals and salivary glands were not involved. In Hochheim's case the periphery of the lachrymal gland was infiltrated with round cells from an extension of the orbital tumor. (2) The cases of Tomasi-Crudeli,¹⁵ Oxley,¹⁷ Treacher-Collins,¹⁸ Birch-Hirschfeld,¹⁹ Coppez²⁰ (Cases I, II, and III), and Stock²¹ (case Bilher) are closely allied to the pseudoleukæmic cases but were not included in this group; first, because here also the lachrymals and salivary glands were unaffected; and secondly, because the tumors had a definitely malignant character with breaking through of the tumor boundaries and invasion of the neighboring bones, etc.; hence they must be considered rather as *lymphosarcomata* of the orbit. Meller claims that in lymphosarcoma the tumor growth is chiefly retrobulbar, in contrast to the pseudoleukæmia of the orbit, in which symmetrical nodes occur in the anterior portion of the orbit. These tumors have, like a sarcoma, an aggressive character, which is in marked contrast to the behavior of the glands in leukæmia, pseudoleukæmia, and the benign lymphomata. Türk explains this local aggressiveness as the result of a disproportion between cell growth and cell removal too great for the local relationships; this must be especially true of the orbit, where all the paths for the removal of cells are failing. This group of cases cannot be separated clinically from pseudoleukæmia, for it is not until operation or postmortem reveals the malignant characters, that the diagnosis of lymphosarcoma can be made. The course as might be expected is a shorter one.

In this group of twenty cases the clinical picture is similar to the pure Mikulicz's disease except that the lymphatic glands either locally or generally are enlarged. This lymphatic enlargement varies also in degree, from small barely palpable glands to those the size of a pigeon's egg. Periadenitis is rare, and softening, pus formation, or caseation does not occur. The spleen is involved in a certain number of cases. There is a tendency to hyperplasia of the lymphadenoid tissue in the conjunctivæ, orbits, and nasopharynx. Cutaneous infiltration was noted by Haeckel, and periosteal thickening by Von Brunn. The blood may show a normal hæmoglobin

and red-cell count, though moderate anæmia is not infrequent. The white cells are not increased and the blood formula is usually normal, though just as in pseudoleukæmia generally there may be a relative or even an absolute increase in the small lymphocytes. Large lymphocytes may also be found. An eosinophilia has been noted by Marcuse (16 per cent.) and Pfeiffer (13.5 per cent.). The latter may be in association with an increase in the size of the glands, as found by Kümmel, or with a malignant character, as found by Zappert, or after X-ray treatment, as shown by Schülz and Hoffmann experimentally. Occasionally there is an increase in the large mononuclears, as in the cases of Cutler (18 per cent.), Marcuse (8 per cent.), and Von Brunn (10 per cent.). In the latter's case there were repeatedly occasional normaloblasts, twice a few megaloblasts, and once one or two myelocytes; this was, therefore, considered "pseudoleukæmia of the lymphatic type with aplasia of the bone-marrow." A true leukæmic blood-picture might have developed had not death supervened. Some cases of pseudoleukæmia run their entire course to cure or death without showing any further change in the blood-formula; others develop in the course of months a true leukæmic picture (*e.g.*, Stock's case, "Lorenz"). Benefiting from this experience Stock would only consider as true pseudoleukæmia cases which show a normal blood-picture to the time of death. We agree, however, with Snegireff that such systematic blood examinations are often wanting, and like him would accept the above-detailed cases as at least conditionally pseudoleukæmia. Here also, as in the preceding group, there may be a subsidence of the glandular enlargement during the course of an intercurrent affection, as erysipelas (Zirm), acute pleurisy (Osler), ulcerative enteritis (Haeckel), etc.

LEUKÆMIA

The cases abstracted below belong to this third group:

CASE I (*Gallasch*,²² 1874).—Male; æt. 4½ years; no stigmata except rickets; leukæmia with ratio of whites to reds of 3:21; fever; cutaneous and conjunctival hemorrhages; general lymphatic enlargement; liver and spleen enlarged; tonsils hypertrophied; nasal and buccal mucous membrane dry; thyroid normal; during the course of the disease, the lachrymals, parotid, and submaxillary salivary glands and both testes enlarged; profuse salivation; ulcerative stomatitis; retinitis leukæmica; death six months after onset;

autopsy; microscopically the glands showed lymphoid infiltration with wide separation of the acini; gland epithelium played passive rôle; interacinous connective tissue filled with large lymphocytes; atrophy and degeneration of some ducts of glands.

CASE II (*Bück*,²⁸ 1899).—Female; æt. (?); married; both parotids and lachrymals enlarged; stomatitis; tonsils large; spleen, liver, and lymphatics enlarged; pain over sternum; Hb. 55–28 per cent., R.C. 2,100,000 to 1,450,000, W.C. 460,000 to 750,400; few polynuclear neutrophiles, many unripe mononuclears (Grawitz); small lymphocytes, eosinophiles, neutroplutic myelocytes, and erythroblasts (i.e., myelogenous leukæmia?); acute nephritis; death; no autopsy; no report on lachrymals or parotids.

CASE III (*Dunn*,²⁸ 1893).—Male; æt. 8; no stigmata; scarlet fever with nephritis one year before onset; granular conjunctivitis six months previously; first swelling of left and eventually right parotid; no other salivary glands affected; orbital tumors with exophthalmos; deafness; fever; weakness; emaciation; cervical, axillary, and inguinal glands enlarged; subcutaneous temporal tumors; liver and spleen not enlarged; intercurrent diphtheria; blood revealed characteristic leukæmic picture; Hb. 30 per cent., R.C. 1,830,000, W.C. 114,395, or a ratio of 1:15; no differential count given; increase of growth; death from exhaustion; no autopsy or histological examination; duration six months; iodide and arsenic given.

CASE IV (*Kerschbaumer*,²⁸ 1895).—Male; æt. 25; no stigmata; both lachrymals enlarged at autopsy; double exophthalmos; infiltration of lids and orbits; conjunctivæ red and ecchymotic; salivary glands not mentioned; general lymphatic enlargement; thyroid gland, spleen, and liver enlarged; blood showed leucocytosis (no count); i.e., lymphatic (?) leukæmia; death; autopsy; conjunctivæ, choroid, and retina showed round-cell infiltration; orbital tumors; both lachrymals considerably enlarged due to round-cell infiltration between acini so that in many places gland structure was lost; infiltrations consisted of small round cells, lymphocytes, polynuclear neutrophiles, and giant cells; some fatty degeneration of gland epithelium; vessels showed hyaline degeneration; lymph-glands, spleen, liver, and kidneys showed usual changes; bone-marrow not examined; bacilli and cocci found in all viscera, especially gland and spleen.

CASE V (*Stock*,²⁸ 1906).—"Lorenz." Male; æt. 64; first parotids, later lachrymals; other salivary glands not mentioned; infiltration of orbit; periosteal tumors on lower jaw, above orbit, on hard palate, and sphenoid; exophthalmos; diplopia, lachrymation, and dryness of throat; cutaneous eruption with ulceration; general lymphatic enlargement; spleen enlarged; blood in July, 1904, showed a moderate anæmia and no leucocytosis but a marked absolute and relative increase of lymphocytes (40–50 per cent.); in December, 1904, Hb. 105 per cent., R.C. 5,176,000, W.C. 53,600, P.N. 6.2 per cent., Ly. 76.1 per cent., S.Ly. 0.5 per cent., Trans. 0.5 per cent., Eosin. 16.4 per cent.; hence the case was at first pseudoleukæmia with later development into chronic lymphatic leukæmia; diminution of glands after eight months' atoxyl treatment; subsequent death from bronchitis; death; no autopsy; duration five years.

CASE VI (*Senator*,²⁸ 1907).—Female; æt. 6; lachrymals, parotids, submaxillaries, and sublinguals enlarged; slight exophthalmos with swelling of lids;

left tonsil large; general lymphatic enlargement; spleen and liver not mentioned; blood reveals lymphatic leukæmia (count not given); periosteal tumors over frontal and parietal bones; greenish-yellow color to skin and tumors; hence chlorolymphoma.

Rejected Cases.—The majority of the cases (e.g., Chauvel,²⁰ Leber,²¹ Osterwald,²² Birk,²³ Delens,²⁴ Frölich,²⁵ Glinski,²⁶ and Meller²⁷) rejected by me showed merely orbital tumor formation or involvement of the eyelids during the course of leukæmia without definite enlargement of the lachrymal glands; in Lindner's²⁸ case the lachrymal glands were acutely inflamed with pus-formation. Even though in one or two cases there was microscopically round-cell infiltration these were not included in our series as we are dealing only with chronic enlargement of the lachrymal or salivary glands.

Enlargement of the lachrymals and salivary glands was recognized during the course of leukæmia years before Mikulicz first called attention to his syndrome. In this group there is in addition to the symmetrical enlargement of the lachrymals and salivary glands,—the usual leukæmic ear-marks of general lymphatic enlargements—enlargement of the spleen, anæmia, and leucocytosis with a pathological blood-formula; in addition there are malaise, weakness, fever, œdema, hemorrhagic retinitis, etc. This group includes but six cases, a small number as compared with the relatively large number of the two former groups. It is claimed by two authors that some of the cases of the two former groups should rightly be classed here if more careful blood-counts had been made originally, or subsequently before the termination of the case. This contention is in part true, for many of the cases were reported before systematic blood-counts were made a routine; and others, in which careful counts were taken, were reported before the cases had terminated favorably or otherwise. According to Meller all the reported cases belong to the lymphatic type of leukæmia, and he states it is not known whether in myeloid leukæmia the lachrymals and salivary glands may become enlarged. This is open to question, for I think it is possible if not probable that the cases of Bäck and Dunn belong to the myelogenous variety on account of the very high leucocytic counts (viz., 750,400, and 114,395 respectively), but from the absence of differential counts a positive diagnosis is impossible. It so happens that in none of the six cases is there an illustration of the subsidence of the gland during the course of an intercurrent affection, but so frequent is the latter event that it needs no further substantiation.

THE SYNDROME AS A WHOLE

Even the most casual reader will be struck with many points of similarity in the cases of these three groups. First the completeness of the involvement of the lachrymal and salivary glands in the majority of the cases—it is of interest to know that in the only three cases in which the condition of the pancreas was noted either clinically (*e.g.*, Hirsch and Marcuse) or histologically (Haeckel) there was no abnormality—secondly, the firm, smooth, and painless character of the tumors; thirdly, the chronicity of the affection; fourthly, in the first two groups the absence of all symptoms, save those arising from mechanical interference. The involvement of the lymphatic and hæmatopoietic systems, either in whole or in part, is not common to all, though it not infrequently develops in the course of the disease. Haeckel's case, in which there was the usual involvement of the lachrymal and salivary glands with pseudo-leukæmic infiltration of the skin but no affection of the lymphatics, spleen, liver, or blood-picture, is another link in the chain between the strict Mikulicz's disease and the pseudoleukæmic group. We must therefore admit with Wallenfang and Von Brunn that there is a continuous chain of cases from isolated disease of the lachrymal or salivary glands to general involvement of these glands plus the pathological blood-picture of leukæmia.

Meller too believes that if one considers Mikulicz's symptom-complex as a disease *sui generis* one must exclude all those cases in which a general lymphomatosis occurs and which belong to pseudo-leukæmia and leukæmia. But he points out that such a distinction would leave out a continuous series between isolated disease of these glands and general pseudoleukæmia. Further, it must be borne in mind that pseudoleukæmia can be limited for a long time to one portion of the lymphatic apparatus. Again, recent advances have shown that a sharp line between pseudoleukæmia and leukæmia cannot be drawn; the first intermediary group is Kundrat's lymphosarcomatosis, which is a localized, very aggressive hyperplastic tumor formation of the lymphatic tissue; the next group includes cases of unusual tubercular adenitis. Chloroma, in which the first symptom is often exophthalmos, was formerly considered as a distinct clinical entity, but is now included under leukæmia. Türk suggests the term "lymphomatosis" for the entire group of hyper-

plastic tumors of the lymphatic apparatus—a term adopted by Meller.

Accordingly, for the above reasons, I do not think we are justified in considering Mikulicz's disease as a distinct clinical entity, but rather as a clinical syndrome which may or may not run its course without involvement of the lymphatic and hæmatopoietic systems.

THE PATHOLOGICAL ANATOMY

As to the pathological anatomy of the first two groups there is a great diversity of opinion. No two cases are exactly similar in every detail. Speaking broadly there may be said to be two different pictures, viz.: that of lymphadenoid hyperplasia, and that of chronic inflammation.

I. *Lymphadenoid Hyperplasia*.—Mikulicz, Tietze, Kümmel, Wallenfang, Minelli, and in fact the majority of writers have observed, enclosed in a delicate reticulum, a diffuse round-cell or lymphocytic infiltration as well as isolated collections of lymphoid elements; the latter are round and circumscribed, resembling lymph-follicles, and occur irregularly in the tumor; between these is a more or less thick net-work of vessels; in a few cases (Tietze) one sees endothelial proliferation in the capillaries; there is also a distinct thickening of the vessel walls, and even hyaline degeneration (Kerschbaumer). Raymond found in several places amyloid degeneration. In the course of the disease there may be developed a proliferation of the interstitial and enveloping connective tissue with consequent sclerosis (Zirm, Kerschbaumer, Snegireff). The ultimate fate of the gland-tissue proper has not been determined by all authors; Mikulicz and Minelli found a few remains of the gland substance amidst the round-cell infiltration; Fuchs, Tietze, and Becker, on the other hand, found absolutely no gland-tissue. Mikulicz and Zirm had no doubt that the process originates in the interstitial tissue and that the gland elements play a completely passive rôle; in this contention they have the support of Kümmel, Meller, and Snegireff. Wallenfang maintains that against a primary degeneration of the epithelium and a simple reactive growth of connective tissue speaks the marked growth of new-built cells, which may extend beyond the capsule; but the picture is by no means that seen in the simple growth of lymphatic tissue of chronic

irritative conditions; the cells are larger than the latter and more like those seen in the centre of a normal lymph-gland. Wallenfäng therefore considers these changes noted in his case as pseudoleukæmic lymphomata, under which heading also many of the reported cases of so-called "Mikulicz's disease" must be grouped. That histologically there is no evidence of the pseudoleukæmic character in the isolated lachrymal or salivary-gland cases is due often to the fact that they are too old to show these early changes. Minelli also believes that the destruction of the gland epithelium occurs only secondarily in a mechanical manner, and not as a result of any toxic agent acting primarily on the gland tissue.

II. *Chronic Inflammation*.—Hirsch and Haeckel are the two chief supporters of this description. Hirsch claims to have observed beyond any doubt a direct transition of the round-cell infiltration to new-formed connective tissue. Further he noted an independent degeneration of the gland parenchyma in all stages of the disease and affecting even the lobules which were not related to the round-cell infiltration; here one could see faintly-staining nuclei. Haeckel saw in some places a transition of masses of round cells into connective-tissue cells with long nuclei—a true fibrous connective tissue; here the acini were few and separated widely by connective tissue; a beginning degeneration of the gland epithelium occurred where the glands seemed otherwise normal and free from round-cell infiltration and new connective tissue. Küttner described in some parts a relative integrity of the parenchyma with increase of and small-cell infiltration of the connective tissue and an accumulation of leucocytes around the vessels and ducts; in other parts there was an intense cellular invasion of the peripheral lobular zones, leading to a complete destruction of the latter.

III. Other observers found, as is often the case, there was truth in both of the foregoing descriptions. Thus Snegireff in two cases observed round-cell infiltration, here and there follicular-like, and the development of connective tissue in its various stages; on the other hand there were groups which showed that the connective tissue originated not from the round-cell infiltration but from the proliferated interstitial tissue under compressions of which the round-cell infiltration disappeared. In Minelli's case there were both substitution of the parotid tissue by lymphatic tissue and also

a gradual repair of the latter by elements which lie in the neighborhood of the vessels or which the trabeculae of the gland produce. It is certain, according to Minelli, that the lymphatic tissue which has invaded the lobules of the glands can in its turn be invaded by young connective tissue. The same phenomena can be seen in hard lymphomata and in atrophy of the thymus. He does not agree with Hirsch, who believes that the round cells must be considered as young "infiltration-elements" and not as lymphocytes.

Kümmel, Tietze, Hirsch, Wallenfang, and Minelli found pictures resembling giant cells; according to Hirsch the situation of the nuclei and the various transitional forms force one to conclude that they are "conglutination cells" which originate from degenerated acini cells whose boundaries have merged into one another. Minelli believes they are not wandering cells but that they originate from gland-epithelial cells by compression of the surrounding lymphocytic cells; i.e., they are phases in the destruction of the gland epithelium. Wallenfang maintains they cannot be considered as conglutination giant cells but rather as "phagocytic foreign-body giant cells."

Eosinophiles were noted by some observers, notably by Minelli, who found them everywhere, but especially at the periphery of the lymph-follicles where the fibroblastic production was most evident. To account for their presence Minelli does not accept the possibility of a local origin but believes rather in the positive chemotactic action of the broken-down epithelial cells for the circulating eosinophiles. According to Kümmel the growth never invades the capsule in the first group of cases. Slight invasion does occur at times in the second group.

Leukæmic Cases.—Here the usual pathological-anatomical picture is presented, namely, a nodular or diffuse formation of atypical lymphoid tissue. The microscopic picture, aside from the great numbers of leucocytes in the blood-vessels, cannot be distinguished from that of "lymphocytosis"; there is the same lymphoid infiltration with wide separation of the acini. According to Gallasch the gland epithelium plays a passive rôle, though as Kerschbaumer points out the gland structure may be lost from pressure and eventually replaced by round cells and connective tissue. Fatty degeneration of the gland epithelium and hyaline degeneration of the

vessels were noted by the latter. Hence, to quote from Warthin, "so far as the essential pathology is concerned no histological difference can be discovered between these two types [leukæmic and aleukæmic] and one may pass into the other."

PATHOGENESIS

I. *Theory of Lymphadenoid Hyperplasia*.—Berlin, Arnold, Minelli, Tietze, *et al.* believe that the tumors originate from the preformed lymphatic tissue in the orbits and between the gland alveoli and capillaries of the salivary and lachrymal glands. Since Heidenhain and Gianuzzi have shown that there is normally lymphatic tissue in the interstices of the salivary glands, and Berlin, and later Axenfeld, not only lymphadenoid tissue but even follicles in the lachrymal glands, one can no longer doubt the possible origin of these tumors from a proliferation of the lymphadenoid tissue of the lachrymal and salivary glands. Tietze regards the enlargements as adenoid growths of the glands similar to that in the tonsils and in adenoid vegetations of the nasopharynx. Wallenfäng believes that it is not a simple hypertrophy but a pseudoleukæmic process. Kümmel in 1897, from his belief in the lymphadenoid nature of the tumors, suggested the name of "achrocytosis" (Greek, *ἄχρους* colorless or white, and *κύτος* cell). Minelli believes that the tumors have a lymphatic origin, and that from a purely pathological standpoint one can make out no difference between a solitary benign lymphoma and pseudoleukæmia; further, in the latter there also occurs a marked collection of lymphocytes around a nuclear centre. The process may have remained confined to the lachrymal and salivary glands for years or may become generalized just as is the case in Hodgkin's disease. He concludes that it is conceivable that a pseudoleukæmia may occasionally develop in the salivary glands, but this is exceptional.

II. *The Inflammatory Theory*.—Hirsch points out that the independent epithelial degeneration and the transformation of round-cell infiltration to connective tissue offer a new explanation for the underlying process of the disease. The lymphadenoid growth from pre-existing lymphoid tissue, as believed by Arnold, Heidenhain, and Kümmel, cannot be accepted for his case, as "connective tissue never develops from lymphatic tissue." He believes that the same

process is at work in the cases of Mikulicz, Tietze, and Kümmel as in his—the difference being that the former were in an earlier stage before the round cells were transformed into connective tissue; in his own case the process was in a later stage and therefore he considered it not a lymphatic growth but a diffuse chronic indurating process, which at first causes a marked increase in volume and later a marked shrinkage of the affected glands, just as in Charcot's hypertrophic cirrhosis of the liver; hence he suggests the name of "cirrhosis of the lachrymal and salivary glands." Kümmel likens the process to secondary induration of the pancreas from cholelithiasis, though in one of his cases there was no calculus, the condition having originated by a spreading inflammation from the buccal cavity along the duct. Further Hirsch considers that Mikulicz's disease is a local disease of the affected glands and therefore has nothing to do with a general lymphomatous process and above all is not due to a general infection. Sternberg cannot decide whether all the cases of so-called Mikulicz's disease belong to a single disease, but believes that at least they must be considered as a local infection of the salivary glands and not a systematic disease of the lymphatic apparatus.

III. Between these two opposed views lies the quite tenable combined theory. Meller cannot believe the Mikulicz symptom-complex is either a simple lymphomatous disease or an infection of a chronic inflammatory nature; the pathological-anatomical picture cannot be held as distinctive; in one group there is a hyperplastic growth of the pre-existing lymphadenoid tissue, *i.e.*, a regional hyperplastic lymphomatosis; in the second group there is a small-cell infiltration of inflammatory origin, the affected glands being first swollen and later shrunken.

The pathogenesis of the leukæmic tumors, according to Stock, presents two possibilities. First, the tumor may originate from preformed lymphoid tissue which is stimulated to proliferation by a general infection. This view has the support of Meller. Secondly, the tumors may be metastases which originate through the blood-stream from a primary focus; hence the blood-picture is merely a symptom of the primary disease (as sarcoma), which is not so malignant as a "lymphosarcoma." Stock believes that here also truth lies between these two extremes.

ETIOLOGY

Nearly all authorities are in accord with Mikulicz that the condition is an infectious or a parasitic process in the widest sense of the term, though none have been able to demonstrate the presence of bacteria either in the fresh or the mounted preparations. According to Mikulicz the infection originates not in the blood but in the mucous membrane of the conjunctivæ, passing thence to the lachrymal glands and by the lachrymal duct to the buccal mucous membrane and the salivary glands, owing to the proximity of the openings of both in the nasopharynx. In many cases (*e.g.*, Mikulicz, Becker, Adler, and Haltenhoff) there was a pre-existing disease of the mucous membrane. Against an ascending infection of this nature is the fact that the gland tissue escapes. Küttner, however, does not consider that the non-involvement of the gland parenchyma speaks against an ascending infection, for the gland tissue in the most varied conditions of the salivary glands remains passive. Meller does not regard it as certain that even in the strict Mikulicz cases the portal of entry is the conjunctivæ. Kummel, on the other hand, considers that the difference between the glands in the first and second groups of cases depends upon the different entrance points.

The nature of the chronic inflammatory process is not known; some may be of a general septic infectious nature, others of a tuberculous, and still others of a luetic nature. Wallenfäng believes that various bacteria and non-bacterial poisons can produce the disease. That both tuberculosis and lues may cause solitary or even symmetrical disease of a pair of the lachrymal or salivary glands has long been known. Meller considers that in some cases of Mikulicz's disease the chronic interstitial change is a modified tuberculous process which has resulted in the death of the cellular elements. This claim is analogous to that of many of the German pathologists who regard Hodgkin's disease as a modified tuberculous condition. In the cases of Hirsch, Fleischer, Osler, Meller, and Napp the underlying cause seems to have been tuberculosis. Tubercle bacilli were never found in the glands of a typical case of Mikulicz's disease until Napp (1908) reported acid-fast bacilli.

Though in some of the accepted cases of our series tuberculosis may be the underlying factor of the process, yet they present a

clinical and histological picture entirely different from the following cases; some were rejected on account of the presence of tubercles and acid-fast bacilli in the affected glands: Müller (2 cases), Süsskind,⁹⁷ Wagenmann, Strubenrauch,⁹⁸ and Plitt;⁹⁹ but the majority because of the presence or suspicion of tuberculosis elsewhere in the body or the discovery of tubercles in the lachrymal or salivary gland; e.g., Abadie¹⁰⁰ (2 cases), Mikulicz (Case II), Baas (2 cases: 1894), Dianoux (2 cases), Salzer, Pick,¹⁰¹ Van Duyse¹⁰² (1896), Lodato, Axenfeld (1899), Jessop, Posey, Fahrenholtz, Fortunati, Stieren,¹⁰³ Haemers, Polignani, O'Zoux, De Paoli, Legeren, Kiesow, Bockhorn, Aievoli.

In regard to the luetic nature of many cases Hochheim considers that conclusions as to etiology depending upon a cure by mercury and potassium iodide are not possible, because both drugs are successful in non-specific as well as specific inflammations. Recently Gutmann has reported a typical case of Mikulicz's disease which developed three years after the primary sore. As far as I could find no observer has examined the tissues for the *Spirochæte pallida* with the exception of Heller, who met with negative results in a suspected luetic tumor of the sublingual gland. We have excluded from this paper certain cases (e.g., Horner,¹⁰⁴ Frost,¹⁰⁵ Koller,¹⁰⁶ Millée et Vidaur,¹⁰⁷ Lapersonne,¹⁰⁸ Heller,¹⁰⁹ Claus¹¹⁰) on account of insufficient data or the presence of other unquestionable luetic stigmata at the time of observation.

Hypothyroidism has recently been suggested as a cause for enlargement of the salivary glands by Apert, who refers to a case of his own and another reported by De Jong and Joseph, in both of which there was hypothyroidism and infantilism. Apert also points out the close relationship between the physiology and pathology of the salivary glands and the genital organs, as illustrated by the salivation of menstruation, pregnancy, and disease of the pelvic viscera.

Dunn considered "thyroidism" to be present in his case and therefore would suggest the name of "salivism" for the disease process. A family predisposition to enlargement of the salivary glands is well illustrated by Quinke's case and to a less marked degree in Lafolley's (Case VI).

TREATMENT

Internally various drugs have been tried, but arsenic and potassium iodide have given the best results. They are sometimes combined and sometimes given separately. Certain cases of amelioration are reported from the use of iodides in small doses given over a long period, in which there was no luetic taint.

Massage and electricity have not been of much service. If the condition be due to a hypertrophy of the lymphatic tissue, which according to Senn may be influenced in other organs by the Röntgen rays, one would expect similar results by this method. Fittig, Ranzi, Von Brunn, Pfeiffer, and Haenisch have obtained considerable benefit in three cases following the use of the X-rays. Sufficient time, however, has not elapsed since the institution of the treatment to warrant any positive statement as to their curative power. Van Duyse obtained slight improvement, while Cutler noted no benefit from the treatment. The rays can act only locally and not generally. Though they must be used with caution no ill effects have as yet been reported.

Extirpation of the tumors may in certain cases be resorted to for æsthetic purposes. As a general rule surgical intervention is unnecessary except perhaps if a suspicion of lymphosarcoma be entertained.

CONCLUSIONS

1. Mikulicz's disease is not a simple disease entity but a clinical syndrome which varies very greatly in its form, etiology, and course.

2. Under this term we must accept isolated as well as symmetrical disease of the lachrymal and salivary glands due to simple lymphomata, pseudoleukæmia, leukæmia, tuberculosis, and syphilis.

3. A whole series of cases exists forming links in the chain from isolated lymphomata of the lachrymal or salivary glands to complete involvement of these glands with simultaneous disease of the lymphatic and hæmatopoietic apparatus.

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ACUTE TUBERCULAR RHEUMATISM

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RHEUMATIC manifestations of bacillary origin occur in three different forms: indefinite pain, spontaneous or revealed by examination, more or less localized to the joints, or extending to the segments of the limbs; attacks of arthritis, acute or subacute, of one or several joints, with the exact clinical appearance of ordinary acute rheumatism, or of an attack of infectious rheumatism; or, chronic articular disorders giving rise to knotty joints or ankylosis. It is our purpose to-day to examine the first two of these varieties.

ARTHRALGIA

Under this heading can be grouped a series of rheumatoid manifestations affecting the joints, which are of common occurrence with tubercular patients. Attention was drawn to them long ago by Bean and Peroud; but a more detailed clinical study was published by Weill more recently in his work on nervous disorders in tuberculosis.

We find among patients infected by Koch's bacillus a great variety of more or less durable pains affecting the muscles and nerves,—such as facial, intercostal and sciatic neuralgia,—due to toxin impregnation.

Pains in the joints are also not at all rare, and are due to very slight and purely inflammatory alterations of the bone or synovial membrane; they are the first stage of a toxi-infection that may become more aggressive. They must, therefore, be included in a description of tubercular rheumatism, of which they are a frequent variety. Trebeneau found nineteen cases of this sort among eighty-four of bacillary rheumatism, taking medical and

surgical manifestations together. A knowledge of these cases is, therefore, very useful in daily practice.

They may either be spontaneous, or have to be searched for. Seldom acute and violent, more usually badly defined, they are made worse by motion and fatigue, whereas rest generally relieves them. Now and then they seem to resist every therapeutic effort. They are found in all the joints, but more frequently in the large than in the small ones; they are not unusual in the spinal articulations, where they may give rise to unfortunate errors of diagnosis.

This variety of pain deserves to have attention drawn to it, as it may become a useful premonitory symptom of a latent tubercular process; it may be present for a long time in advance of more virulent lesions, and in such cases it is very desirable that it should be recognized in good season. In children, and during the period of development, it is generally mistaken for osteitis or growing pains, and its localization in the neighborhood of the epiphyses renders confusion very easy. We thus remember apparent cases of coxalgia and Pott's disease of this nature, whose rapid recovery occasioned great surprise, and of which the real origin was only discovered later by the appearance of serious tubercular lesions.

It is a common occurrence to meet with osteo-arthralgia in a tubercular patient at the consumptive period, and it is then often the only trace of a bacillary infection that has healed up and disappeared.

Two forms are to be distinguished: First, hyperæsthesia of the muscles; second, hyperæsthesia of the bones, the latter of which is a non-articular localization of rheumatic tuberculosis to which reference will be made further on.

The characteristic of these manifestations is the absence of all objective signs: there is neither redness nor swelling of the soft tissues. Their variability and fugacity are also quite peculiar; they are erratic, spring from one joint to the next, and sometimes finally settle for more serious mischief at some special point. Certain of these pains of coxotuberculosis are a common example of this variety.

ACUTE AND SUBACUTE TUBERCULAR RHEUMATISM

This second form of tubercular rheumatism is characterized by sudden inflammation of one or more joints resembling the clinical appearance of ordinary acute articular rheumatism.

This form is less frequent than the one just mentioned, and in practice is often unrecognized by physicians, who are too easily contented with a diagnosis of rheumatism. It cannot be too often repeated that the diagnosis of rheumatic polyarthrititis has no longer any signification whatever in our days; we must penetrate beyond this superficial symptom-complexus, and endeavor to discover by all the means at our disposal a complementary pathogenic epithet. If we take the trouble, and know how to search, we will find out at an early date in many cases that the rheumatic inflammation is only a striking symptom of an infection that is hidden, and is not a disease in itself. In tuberculosis, more than in any other infection, it is of the greatest importance to be sure as to this pathogenesis, and army surgeons in particular will find therein one of the most valuable premonitory signs of incipient tuberculosis.

For tubercular rheumatism, which is a common occurrence in the course of evident tuberculosis whether medical or surgical, can also be the first manifestation, sometimes at a great distance, of tubercular infection. In Egmann's thesis three cases were reported out of sixteen in which it had preceded pulmonary phthisis. Since that time we have frequently observed that form, until finally we made an attempt to ascertain in what proportion this symptom occurs. Among a hundred patients entering the hospitals for articular lesions considered to be rheumatic, with thirteen it proved to be the opening scene, in the form of articular inflammation, of tubercular lesions that ultimately turned out to be serious. Furthermore, among a hundred chronic cases of tuberculosis, twelve were found with whom an attack of acute articular rheumatism had occurred in the past as an early sign of the infection.

The clinical signs of acute tubercular rheumatism do not differ much from those of ordinary rheumatism or of acute pseudorheumatic attacks. The suddenness of its appearance, usually entirely without premonition, resembles the course of infectious arthritis and more particularly of that due to gonorrhœa. It is usually seen in the large joints, such as the knee and hip; after that, and in decreasing proportion, in the elbows, wrists, and ankles. The local symptoms, pulse, temperature, etc., depend much more on the degree of general infection than on the articular manifestations to which the disorder gives rise. A serious general condition, with articular

lesions of moderate intensity, is often a presumption in favor of tubercular rheumatism.

Certain peculiarities in the mode of procedure of these attacks deserve to be mentioned: tubercular rheumatism may recur several times in successive attacks at intervals of months or years separated by periods of complete good health, a character that is of great importance, as it is a source of confusion with ordinary rheumatism.

Its duration varies: it may disappear in a few days, or may last for weeks with phases of exacerbation or remission. Sometimes it passes from joint to joint, as does ordinary rheumatism; at others it assumes a sluggish, relapsing character, with attacks of pain, which, when they are frequent, are an early indication of chronic, deforming rheumatism; at others, finally, it settles on one or more joints with the greatest tenacity, recalling certain articular manifestations of gonorrhœa. In some cases it ends in fungous transformation or ankylosis, though in many instances it finally retrocedes entirely without leaving any trace.

These general ideas being understood, we can divide these cases into two varieties according to the circumstances of their appearance: primitive, and secondary rheumatism. We have already mentioned the usefulness of this distinction: the first variety is of the greatest value as a means of diagnosis and prognosis; the second is only an episode, of varying prognosis, which does not affect in any important way the pathological situation of the patient.

A. Primitive, Tubercular, Acute, Articular Rheumatism.—We have already spoken of its frequency and given an outline of its evolution. Two varieties must be distinguished: in the first, the rheumatic symptoms affect the serous membranes at the same time; in addition to the articular symptoms there may be pleurisy, pericarditis, etc. In the other, the disorder is confined to the joints.

1. *The Diffuse, Acute Form of the Serous Membranes.*—This is not of very common occurrence, and does not represent more than 15 per cent. of the cases of primitive acute rheumatism. Its evolution is quite typical; and it can be easily recognized.

A young man in good health, or perhaps run down and depressed by overwork or cares, is suddenly seized with acute arthritis, with fever, dyspnœa, rapid pulse and sweats. The patient's general condition is quickly affected, and from the start the physician receives

the impression that the case is one of a serious infection. The joints, which are hot, red and painful, are incapable of the slightest movement. The general condition grows steadily worse, and an inflammatory process appears either simultaneously or successively in the serous cavities, pleura, meninges, peritoneum, etc. Each new localization is accompanied by a rise of temperature and an aggravation of the general symptoms. Such cases may recover, but as a usual thing the patient succumbs to the different localizations of this general tuberculosis. The articular symptoms, whose importance is effaced very quickly by the serious nature of the other localizations, continue to the end. The total duration of the disorder may require months, during which time periods of aggravation and of temporary improvement alternate with each other. The following succinct notes of a case will give a good idea of this clinical type.

A young woman whose health had been good up to that time was suddenly seized with acute articular symptoms of a serious nature; the diagnosis of acute articular rheumatism was made, and large doses of sodium salicylate prescribed. For thirty days the condition remained stationary, neither better nor worse, and then signs of endocarditis appeared, followed by meningitis, pleurisy, and finally peritonitis, ending in death, the disease having lasted nearly a year.

This variety of tubercular rheumatism, whose chief interest consists in the appearance of articular symptoms as a prelude to more serious lesions, is closely connected with articular, granular tuberculosis. In both cases the clinical aspect is very similar: it is almost the exact picture of acute articular rheumatism, but the diffuse form, which we are now examining, has not the fulminating course of granular tuberculosis of the synovial membranes,—in other respects confusion is inevitable.

On the other hand, the presence of granulations in the one case and their absence in the other distinguishes these two forms of articular disorder and separates them anatomically. To judge by what we have seen, and taking into account the mobility of certain forms of synovitis and their rapid disappearance, we do not think that a restricted form of granular tuberculosis plays any greater part in these cases than a confluent form.

2. *The Simple Acute, or Subacute Form.*—This is the com-

monest variety, and also the most interesting to be acquainted with, on account of its symptomatic value and nosological importance.

The first rheumatic, inflammatory symptoms are apt to occur between the ages of 20 and 30, and they recur at varying intervals without regularity until a more virulent localization finally appears. The number of these rheumatic attacks that take place before the tuberculosis is evident, can hardly be stated even approximately; still it would seem that the less the patient is prepared by heredity or by his personal pathological history to become tubercular, the greater their frequency. On the contrary, patients whose antecedents are bad, whose system is depressed or debilitated,—all who are an easy prey for Koch's bacillus,—show few precursory attacks, or maybe only one.

These views, the prognostic importance of which is considerable, are by no means hypothetical, but are justified by minute examination of case-histories; in almost every instance in which there have been successive attacks of primitive acute rheumatism, the pulmonary tuberculosis assumes a fibrous type, and progresses slowly. In many instances, also, it does not appear for a long time.

There are, therefore, two phases in the development of the accidents: the first consists in the acute articular manifestations, which cover by their severity all other pathological symptoms; the second is taken up by the outbreak of more violent lesions in a joint or in some organ, and by the evolution of the initial rheumatic articular disorder.

The latter presents no particular features, consisting in one or more polyarticular attacks whose local characters are those of ordinary rheumatism. Nothing is more variable than the course and duration of these attacks; they either get well in a few days, recur at regular intervals, or drag along for weeks and months without being influenced in the slightest degree by a course of treatment with salicylates. The patient's general condition, which had already not been very brilliant, becomes distinctly unsatisfactory, there is loss of flesh, strength and appetite, the fever increases, and the entire symptomatic complexus of latent tuberculosis passes before the physician's eyes without any auscultatory signs, while the articular symptoms continue to occupy the entire attention.

In face of the failure of a specific treatment, and in presence

of this strange, tenacious variety of rheumatism, the physician is puzzled and thinks of pseudo-rheumatism; he then tries in vain to find an explanation for the occurrence of the latter, and thinks of everything except tuberculosis. Little by little the articular manifestations subside, or else settle on one or two joints, where they either become chronic, or finally disappear. The fancied rheumatic patient has by this time become a true tubercular one, and the first act is over. Then begins the second stage, which according to the bacillary localization, and termination of the articular manifestations of the outset, may assume four different clinical types:

a. First Type.—The tuberculosis has affected some organ, lung, intestine, testicle, etc., and the articular manifestations disappear without leaving any trace. Their subsidence occurs at the first symptoms of the visceral tuberculosis, or perhaps later on. The tubercular rheumatism and the more virulent lesions then go through their evolution side by side for weeks and months without seeming to have any mutual influence on each other. One of our patients still showed acute articular symptoms three months after the first appearance of bacillary orchitis. In some cases, finally, the rheumatism disappears before the outbreak of the tubercular lesions that it has preceded; a varying period then elapses between recovery from the arthritis and the clinical beginning of the new localization, and during this time the patient, who seemed in perfect health, thinks that he is definitely cured. The following is a typical instance of this variety.

A man of 50, a veterinary surgeon, was seen by a physician who diagnosed fibrous phthisis with a large cavity at the right apex, and gave a rather favorable prognosis, speaking even of a possible recovery. On questioning this patient he told us that his mother had died of phthisis at 56 and that his sister had lost a child from tubercular meningitis. He himself had enjoyed good health up to the age of 20, when he was kept in bed for three months by an attack of general acute articular rheumatism, during which all the joints were affected, including those of the maxilla. No treatment was of any use and convalescence was very long.

Ten years later another similar attack occurred, equally general, severe and long. Eleven years later there was a third general attack, but less violent. During the next five years his health

was satisfactory, with the exception of occasional articular pains; but this was followed suddenly by the appearance of a serious pulmonary disorder, while at the same time all articular pain disappeared. Since that moment the pulmonary lesions have not advanced much, and the joints have remained silent.

In short, this variety of tubercular rheumatism has the same peculiarity as ordinary rheumatism in that recovery is complete and that no trace of its passage remains in the affected joints.

b. In a second type, after a very acute beginning the articular disorders only retrocede in part, some joints remaining inflamed and ending in ankylosis in spite of every effort. A short time later, or sometimes only after a longer period, a mild outbreak of tuberculosis occurs in the lungs. One of our patients who had lived in tubercular surroundings was seized in perfect health and without apparent cause with acute polyarticular rheumatism which took a long time to yield; when the pain had entirely disappeared it was found that there was ankylosis of an elbow, wrist and foot, and radiography showed that this was osseous. Two years later appeared the signs of moderate infiltration of one apex, whose nature was confirmed by a very positive seroreaction.

c. In a third type, little by little the inflammatory process settles on one or two joints, which gradually become fungous. This evolution is not unusual, and attention was drawn many years ago to this succession of the tubercular virus to rheumatic outbreaks. For many years the exact connection between the two was not evident, but by grouping and comparing all these facts it is not difficult to see that the two varieties of articular manifestations are only necessary stages of the same infection.

A woman of 65 entered our wards for a white swelling of the left knee. She told us that fifteen years previously she was seized with subacute articular rheumatism of both ankles and of the left knee, which disappeared entirely in two weeks; but that since that time similar attacks had frequently occurred with increasing tendency to affect the left knee. Many physicians saw her, all made the diagnosis of ordinary rheumatism, all put her on salicylate without result, and no one observed any sign of tuberculosis. During the preceding year she had been much exposed to dampness and had had several attacks of rheumatism, which little by little had settled on

the one knee, that gradually became fungous, while at the same time her right wrist showed signs of tubercular synovitis. In view of the extent of the damage in a patient of this age, we suggested amputation, to which she refused to submit, and two months later she died in a cachectic condition. Postmortem showed confluent granulositis of the pleura, healthy lungs, and osteotuberculosis of the knee.

From this case will be seen the ordinary course of fungous transformation of the lesions of rheumatic tuberculosis. The evolution is slow; the affected joint remains swollen and painful in certain movements, while from time to time, after fatigues or efforts, a new inflammatory outbreak occurs that only partially disappears. This local condition sometimes goes on for years, and when the physician is still thinking of chronic rheumatism the signs of visceral tuberculosis appear, revealing the exact pathogenic diagnosis of the articular trouble. The situation gradually becomes clear, the diseased joint increases in volume and becomes painful at certain points, and this is followed by the well-known evolution of tubercular arthritis. Even before the appearance of the fungous deposit, the serum of the joint, withdrawn by puncture, renders guinea-pigs tubercular, whereas taken at the beginning it would probably not have been virulent.

When specific tuberculosis settles on several joints that have already been affected by rheumatic tuberculosis, the forms it assumes may be different: fungous synovitis, plastic synovitis, hydrops tuberculosus, and others; the physician can then witness a complete progressive picture of the lesions engendered by the tubercle bacillus.

d. A final type consists in the transformation of the initial arthritis into simple chronic rheumatism. In the beginning the course of the disorder is similar to that of the preceding types; but the lesions remain those of chronic inflammation. The true nature of the case is then usually revealed by the evolution of another tubercular focus that has appeared in the lungs or glands.

B. Consecutive or Secondary Acute Articular Rheumatism.—It is not unusual for acute rheumatism that can be clinically detected to occur during the course of tubercular lesions; its frequency as compared with other kinds of rheumatism is about 50 per cent., and its frequency with tubercular patients and in the commonest forms

of tuberculosis is from 10 to 20 per cent. What we have said about acute primitive arthritis will dispense with our dwelling on the acute arthritis of confirmed tuberculosis; these are no more than ordinary rheumatic attacks that may assume the aspect and follow the course of ordinary rheumatism.

Until recently these articular disorders were looked on as merely arthritic manifestations, and they were considered rather a fortunate occurrence than otherwise, on account of some hypothetical antagonism between arthritism and tuberculosis. But this antagonism does not exist; the so-called arthritic patient curing up his tuberculosis by some sclerous process is just an ordinary tubercular patient with bacillary rheumatism, and his articular manifestations are tubercular from the very first. We are now far from the time when, before the discovery of the bacillus, we were obliged to fall back on the hybrid conceptions to explain rheumatic white swellings. The simple notion of inflammatory tuberculosis has facilitated the comprehension of such occurrences, and the continuous action of an ever-present infection easily explains the various relations that a given patient may present: thus, a woman was in her infancy scrofulous and in wretched health, at puberty suffered from prolonged anæmia, at the age of 19 had lupus of the face, somewhat later acute articular rheumatism with two or three relapses, and finished with chronic deforming rheumatism.

We could cite other case-histories even more complex than this one, and which can only be explained in all their details by the idea of tuberculosis. In most of them there is a constant and evident balancing between the articular manifestations and the visceral lesions; when the first improve, the others grow worse. This balancing feature is generally mentioned by the patients at their first examination, and continues to hold good up to the time when some serious localization, such as a suppurative osteo-arthritis of a great joint or chronic disorder of the spinal column, appears. By that time fixation has taken place, and the inflammatory and metastatic type is gone.

It is nevertheless true that as a general thing we have here to deal with attenuated lesions, whose evolution is of a fibrous nature and consequently slow and torpid, and that such patients frequently live for many years. But this is not at all dependent on arthritism; the original virulence of the microbe is the sole important point.

DIAGNOSIS OF GASTRIC DILATATION

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DILATATION of the stomach, like dilatation of the heart, is produced by failure of the muscular wall to do the work put upon it, and it is obvious that inherent weakness of the wall, or too much work in the form of obstruction at the pylorus, or both, lie at the root of the condition, and must be recognized before intelligent treatment can be attempted.

There are pronounced cases of inherent weakness of the gastric wall (atony, myasthenia), which may run their course without symptoms. Such are found in families, and are exceptional. The larger number of cases of gastric dilatation are secondary to obstruction.

In gastrology, as in most sections of clinical medicine, objective signs are of much greater value than subjective symptoms, and a diagnosis should never be made on one or two subjective symptoms alone. The main feature of the subject under consideration is the determination of the primary operating factor—obstruction or atony—as on this will depend the prognosis and type of the treatment.

Typical cases of gastric dilatation present subjective symptoms of epigastric and sternal oppression caused by continued retention of food, pressure associated with ingestion, and rapid satiety compelling the patient to cease eating before he has partaken of the usual amount of food. In recent cases pressure lasts from half an hour to an hour after a meal; in advanced cases distress frequently lasts from one meal to the next.

In cases of atony following toxæmia (typhoid, etc.), of ingestion of too much food, especially during convalescence from protracted illnesses, of the chronic gastritis of the drunkard, as also in the later stages of dilatation due to obstruction, the tongue is coated, the breath is offensive (stomatitis), the appetite is decreased or lost,—in rare instances the patient suffers from incessant hunger, as in stricture of the œsophagus, since the stomach merely plays

the part of a reservoir without an outlet in which digestion and absorption cannot occur,—and frequent belching of gases (carbon dioxide, hydrogen, and sulphuretted hydrogen) occurs, with pyrosis and vomiting. Appetite is a natural indication that the alimentary tube is healthy and normally emptied.

Vomiting is an intensified form of gastric contraction in which the contents pass along the route of least resistance. The type of vomiting is often characteristic. In the slighter degrees of gastric insufficiency, the weight and distention which follow a meal gradually disappear, and if the patient eats at regular intervals the organ in time empties itself; but in pronounced cases a sensation of uneasiness, weight or pain is felt after each meal, the intensity of which increases as time passes, until perhaps after three or four days and in the middle of the night (never at the time of maximum digestion) an attack of vomiting brings relief. Enormous quantities, amounting to several litres, may at times be brought up, consisting of a mixture of mucus, liquid and solid food, and traces of altered blood. Later, when the walls of the stomach are thinned and much distended, vomiting occurs at less frequent intervals, and is not sufficient completely to empty the organ, nor is the feeling of relief which was at first observed any longer experienced. The longer the ingesta are retained the more offensive is the odor of the vomit. In a few cases, vomiting ceases altogether through complete exhaustion of the musculature. It is unnecessary to dwell upon the fact that in such cases bacterial fermentation runs riot, but it may be pointed out that where large quantities of liquid are retained anaërobic bacteria are freely produced and give rise to numerous highly toxic products. Through the operation of such toxins further subjective symptoms are experienced, *e.g.*, pressure in the head, dizziness, the gastric vertigo of Boerhaave, Trousseau and Leube, weakness in the legs, ataxy, and general muscular insufficiency, at times simulating organic disease of the central nervous system. It should ever be remembered that atony of the gastric and intestinal walls is the most important factor in the production of autointoxication. Constipation is almost universally present and very obstinate. Not only are the stools passed at infrequent intervals, but the quantities are much diminished. Normally four to six ounces of solid fæces are discharged in 24 hours; in atony this

quantity may be reduced to an ounce or an ounce and a half. Normal fæces contain at least 75 per cent. water; in gastric dilatation the water is frequently reduced to 30 per cent. The daily quantity of urine may be reduced to 500 c.c., and is generally alkaline, laden with triple phosphates, and deficient in chlorides. As the stomach absorbs but little liquid patients suffer from thirst.

When on examination the lower boundary of the stomach is found below the umbilicus with a normal position of the upper, and when seven hours after a test-meal a litre of contents can be drawn off, the diagnosis of gastric dilatation is established. In abnormally large stomachs (megalogastria) which give rise to no symptoms, and which are always discovered by accident, the time required to discharge the last portions of ingesta never exceeds seven hours.

As in the case of the heart and other hollow viscera, the mere determination of the size of the stomach is useless; it is necessary to learn exactly the character of its motor power; in other words, to determine whether we are dealing with atonic or hypertonic insufficiency. To this end one employs the following methods of examination: inspection, palpation, percussion, auscultation, inflation with air, tube palpation, and radioscapy.

Inspection, especially when made from the neighborhood of the patient's head as he lies on the couch, with his abdominal walls relaxed, may, in thin subjects, reveal the outline of the greater curvature, and the direction, time and characters of the peristaltic waves. In this connection it may be remarked that peristaltic movements are sometimes replaced by the *intermittent tension* described by Bouveret, or by a *permanent epigastric tension*. The stomach may be reduced in size, even in cases of pyloric obstruction, and consequently not visible. Cases are met with occasionally in which an alternation of spasm and atony occurs; the cause is difficult of determination, but the subjects are mostly neurasthenics of long standing; such cases coincide apparently with the "crises" of Mathieu and Germain Sée.

Palpation assists inspection in recognizing tension, spasm and atony; this method is reinforced by first filling the stomach with air. Palpation may differentiate the borders of the stomach from neighboring viscera. The greatest variety in form of the organ (pyriform, hourglass, etc.) is produced by cicatricial contraction.

Percussion should be carried out very lightly—finger percussion alone is permissible. When properly performed it determines the levels of the greater and lesser curvatures. Dehjo's method is of much service: when a litre of liquid is placed in a healthy fasting stomach, the patient being in the erect position, the dulness representing the greater curvature is always above the umbilicus; in atony below the umbilicus. Dehjo administers to his patient a quarter of a litre of water and outlines the greater curvature; he then administers three further doses of a quarter of a litre, at short intervals, and outlines as before, marking the amount of descent in each case, and so forms an admirable estimate, not only of the position, but also of the size of the organ. He finds that the normal stomach never reaches the umbilicus. The elasticity of the wall (resistance to stretching under action of water or air) is much less in the atonic than in the healthy stomach.

Auscultation reveals the *succussion sound*, and should be used to determine not merely the presence of the sound, but the location and extent of the whole area over which it can be elicited.

Inflation with air (not carbon dioxide) enables us to distinguish true dilatation from displacement and gastropnoia. It must be carefully omitted in all cases of ulcer, meteorism and recent adhesions.

Tube palpation is an excellent method of determining the position of the lower border in patients with thin abdominal walls. Transillumination practised by some can render no service that is not obtainable by other methods. The chemical examination of the contents, of such enormous value in other conditions, is of little use in the diagnosis of gastric atony. The total acidity may be increased or diminished. Lactic acid may or may not be present. Yeasts and *sarcinæ* flourish in hydrochloric acid; *sarcinæ* do not develop in lactic acid. On passing water through the tube into an atonic and dilated stomach, it is curious to note the peculiar little whirlpools that appear in the funnel.

Radioscopy.—In no section of clinical medicine is it possible to obtain more exact information by X-rays than in that of the diagnosis of gastric conditions. Radioscopy of the stomach supplements and completes the above methods of examination. In atonic dilatation and ptosis it supersedes them, in that it presents on the

screen a picture of the organ in size and outline at once precise and definite. Moreover it brings to light several points of the utmost importance of which the other methods take no knowledge, *e.g.*, the position and extent of the chamber of air in the upper zone of the stomach when the patient stands erect, the folding of the organ upon itself in the empty condition, the excessive peristaltic action with rapid discharge of contents in cases of asthenic dyspepsia in neurotic patients. I am deeply indebted to Enriquez and his able assistant Raulot-Lapointe for introducing me to this work in their private practices in Paris, and to the former for his excellent paper on "Ptosis and Atonic Dilatation," which appeared in *La Presse Médicale*, January 11, 1908. Therein it is shown that in each of thirty cases of asthenic dyspepsia, the inferior border of the stomach reached below the umbilicus to distances varying from 6 to 12 centimetres. The radioscopic examination has revealed that the more accentuated forms of gastropptosis are always associated with atony and often with dilatation. The method now demonstrates that the various conditions formerly described as *nervous dyspepsia* by Leube, *dilatation* by Bouchard, *gastro-intestinal atony* by Bouveret, and *ptosis* by Glénard, can all be referred to atony and dilatation. Enriquez adopts the technic of Leven and Barret, in which large quantities of bismuth—not less than 2 ounces—are swallowed in emulsion or cachet by the patient whilst the physician focuses the shadow of the moving mass on the screen. A little experience enables one to follow exactly the course of the mass along the greater curvature, through the pylorus, and down the duodenum. In many cases the state of affairs in the neighborhood of the pylorus, *e.g.*, the rate and degree of gastric contraction, the shape and size of the pylorus, and the level of the latter as compared with the inferior border of the stomach, is manifested with truly marvellous precision and completeness.

TYPHOBACILLOSIS

BY L. LANDOUZY

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THE object of this present paper is to call attention to a type of acute tuberculosis that I described a number of years ago. Although this type has since been met with in medical practice both in France and elsewhere, and has been recognized from the description I published, it does not appear to me to be by any means sufficiently well known.

I look upon typhobacillosis as one of the most distinct and well-defined forms in which Koch's bacillary septicæmia can present itself as an acute disease, both from an anatomical and clinical point of view.

At the time when I first published a description of typhobacillosis the classical belief was that there were two anatomo-clinical types of acute or subacute tuberculosis:

1. In the first form, caseous bronchopneumonia, the tubercular process requires a few weeks or months to become apparent, and does so through the rapid development of anatomical lesions, such as infiltration and softening, ulceration and caseous breaking-down, a stage to which it only develops in several years in the form of ordinary phthisis,—this is galloping phthisis.

In other cases, in the shape of caseous pneumonia, in which death occurs in a shorter time, the tubercular process, although a caseous one, has not the time to result in ulceration and cavities. These are the two varieties of acute caseous phthisis.

2. In the second form the evolution is more rapid, the germination of the seed quicker still. Whether the infection is a general one from the start, or the dissemination of the bacilli has its point of departure in an old tubercular focus, the disease takes the form of a general infectious disorder quickly and relentlessly fatal. Combined with a typhoid state a series of functional disturbances suddenly occur, circumscribed or diffuse though usually diffuse and

complex, and affecting separately or together the respiratory, nervous, or digestive apparatus. The general intoxication of the organism, and the diffusion of the lesions, kill too quickly for the lesions to have the time to follow their evolution up to its natural end, conglomeration and caseation of the follicles. For this reason post-mortem examination shows lesions that are quite different from those of acute caseous phthisis. We here find an efflorescence of countless young and more or less diffuse miliary granulations; the latter appear in masses in the various organs, whose functional reaction gives to the disease either the respiratory, nervous or abdominal forms, which are the principal clinical varieties: this is acute granular phthisis, the disorder first described by Empis.

3. In addition to these forms, and quite separate from them, I described another, in which a bacillary toxi-infection appears whose character is so distinct as to constitute a new type of bacillary septicæmia quite different from those just mentioned.

This third type, typhobacillosis, reveals itself exclusively by a typhoid condition, with continuous fever and enlarged spleen, but without signs of visceral localization. At first sight the resemblance to typhoid fever is striking, and we have no difficulty in understanding why these two typhoid states should have been so long confused, and that they still should be so; nothing but symptomatic variations enable us to differentiate between them.

The first is the irregularity of the temperature curve, which although continuous as in ordinary typhoid shows wider oscillations and irregularities from one day to the next, or from week to week. The next is the dissociation of pulse and temperature, the pulse being generally more rapid in ordinary typhoid. Further important differences are the absence of signs of visceral localization, the absence of pharyngeal and bronchial catarrh (which is constant in typhoid), the absence of both intestinal catarrh and constipation, and finally the absence of lenticular spots, whose importance in my opinion is such that any case of typhoid in which they have not appeared should be looked on as dubious.

When in exceptional cases this bacillary continuous fever leads to a fatal issue in two, three or four weeks, post-mortem examination gives the explanation of this lack of symptoms and of the absence of signs of visceral localization. It shows nothing but congestive

and degenerative lesions such as are common to all great septicæmic processes,—lesions that are diffuse, without preference for any viscus. The most that is found in some cases are a very few small granulations the size of the point or head of a pin, isolated, gray and translucent, quite inadequate to give rise to a local symptomatology, but just enough to write the signature of the disease.

In this way is defined the twofold difference, anatomical and symptomatic, that exists between granular tuberculosis and typhobacillosis; the absence in the latter disease of the eruption of granules in all the organs, together with the absence of local symptoms in the lungs, nervous system or abdominal organs, constitutes between these two forms of acute, bacillary septicæmia a distinction that is unmistakable. A further character, the nature of the evolution of the disease, makes the distinction more marked still: whereas granular tuberculosis is always rapidly fatal, typhobacillosis generally ends in recovery, at any rate in so far as the acute, generalized infection is concerned. During the twenty-five years that my attention has been directed to this clinical type, I have not seen more than about ten cases succumb during the typhoid period.

In the great majority of instances, after three or four weeks of continuous fever accompanied by prostration more or less marked reaching sometimes as far as a complete typhoid condition, with a varying degree of hypertrophy of the spleen (a state during which according to the intensity of the manifestations the diagnosis made varies all the way from typhoid fever to gastric fever), the patient finally becomes convalescent.

But as a general thing this convalescence is not complete; the patients do not regain their spirits, the voracious appetite of convalescent typhoid does not appear and the loss of weight continues. At the end of a few weeks, or perhaps of only many months, appear suddenly or treacherously other signs of a tubercular localization usually pulmonary or pleural, and in children frequently meningeal.

In this connection, and in order to give a clear idea of this evolution, I will recall in a few lines three demonstrative cases that I observed many years ago; they occurred during early childhood and puberty, the period during which typhobacillosis is most common,—of greater frequency than is generally believed.

A child of seven, with no particular antecedents, was seized

with an acute febrile disease that exactly resembled an average case of typhoid fever, with the exception of the absence of catarrh and of lenticular spots. In the fourth week he became convalescent and was taken to the country, whence he returned in good health although in a less flourishing condition than is usual with children who have just had typhoid fever. The winter passed without any trouble, but finally the child awoke one morning, out-of-sorts, with headache, vomiting, fever and convulsions, and succumbed in a few days to tubercular meningitis.

A similar drama in two acts occurred in the case of a little girl of eight: first, apparent typhoid of a mild form, without lenticular spots or intestinal catarrh; seven weeks later a first attack of bronchitis of the right apex, severe, tenacious and with fever. Two years later a series of attacks of febrile bronchitis, and the following year the child succumbed to tubercular meningitis at the age of twelve.

A similar case occurred in a young woman of twenty, who on returning from her wedding journey went through an acute typhoid disorder without lenticular spots and with an irregular temperature curve. On the thirtieth day convalescence began, but unsatisfactorily,—she did not regain strength, her appetite was poor, her appearance was bad, and she began to cough. A month later, induration of the right apex was detected, and bacilli were found in the sputum. The disorder went through an inexorable evolution, and carried off the patient in six months.

In some cases the state of convalescence following typhobacillosis appears quite normal and satisfactory, there is no more fever, and recovery seems to be attained; and yet even in these a tubercular localization occurs sooner or later in a more or less acute form. A history such as this happened to a hospital patient of mine who entered the wards with the usual symptoms of typhoid excepting the lenticular spots; the disorder ran its course, the temperature came down to normal, convalescence appeared to have been reached, and it was proposed to send the patient to the country, when an attack of pleurisy intervened that necessitated tapping twice.

The fact should be known that it is only a small number of these cases of typhobacillosis that recover completely and definitely. The majority of them although cured of their febrile attack, are only

incubating their tuberculosis, and a few weeks or months after the initial acute septicæmia, the real nature of the disorder reveals itself. In the description that I published twenty years ago I said that it was only after a certain preliminary stage of bacillosis that the patients that we are now describing enter into the pathological anatomy and symptomatology of tuberculosis. Sometimes this transition is imperceptible, and there is not even a suspicion of a convalescence; the patient's temperature stays above the normal, while little by little germination of the tubercles occurs and reveals itself. The signs of localization appear as a general thing in the form of infiltration of the apices, that can be detected by percussion and auscultation. This was the case with several patients that I followed, who, seized with typhobacillosis in the spring, without any local manifestation, succumbed the following winter with pulmonary cavities after ten months of continuous fever, without having left their bed. The knowledge that we have now acquired of typhobacillosis leads us to a twofold prognosis: for the present, and for the future, the latter appearing to be the more important, as death is rare during the first stage of the disease. The fact should never be lost sight of that a patient of this category, although convalescent and apparently cured, is always under the menace of a tubercular manifestation; it is this that has led us to say that on the whole the immediate prognosis of typhobacillosis is less severe than that of typhoid fever, whereas the outlook for the ultimate future is incomparably more serious.

Such is this disorder, which, guided entirely by anatomoclinical data, I described twenty-five years ago as a distinct and thoroughly individualized type of acute bacillary infection. But although a certain number of writers have accepted the reality of this description, and have reported cases that confirm it, opinions are by no means unanimous on the question.

The objection has been raised that many so-called cases of typhobacillosis were nothing but ordinary typhoid, and when later on they became tubercular, this was no more than a combination or succession of microbes. It was of course remarked that my cases of typhobacillosis who became tubercular were merely typhoid patients contaminated in the wards by their consumptive neighbors. My opponents have not been able to conceive such a thing as the pos-

sibility of recovery from this acute tubercular infection, to which they felt obliged to apply the fatal prognosis of acute, granular phthisis.

The point that seemed to give weight to these objections was the relative unimportance of the difference of symptoms whereby alone I was guided in differentiating bacillary typhoid from ordinary typhoid. It should be remembered that at the time when I gave my first description of typhobacillosis, in 1883, Koch's bacillus had only been discovered the year before, while Eberth's bacillus had hardly been isolated; we were not yet in possession of any technic enabling us to distinguish with certainty between a case of typhoid, and one of bacillosis. We were obliged to content ourselves with the slight differences in symptoms mentioned above, and, more particularly, to be guided by the evolution of the disorder, and to look on as suspicious the so-called cases of typhoid that relapsed or dragged along for an indefinite period.

But at present the laboratory methods with which we have been supplied during the last ten or fifteen years, and which have now entered into practice, have both supplied us with a scientific demonstration of the reality of typhobacillosis, and have rendered its diagnosis far more simple. On the one hand, we can establish with absolute certainty a diagnosis of typhoid fever due to Eberth's bacillus, by the detection of the pathogenic microbe in the fæces, by Widal's serum-test, and, best of all, by hæmoculture. The same methods permit us to recognize with equal certainty the complaints caused by paratyphoid bacilli. On the other hand, the method of inoculating small animals with blood taken from a vein, Arloing and Courmont's seroreaction, Calmette and Guérin's oculodiagnosis, and Jousset's inoscopy, enable us to detect with certainty cases of septicæmia due to Koch's bacillus. Applied to the diagnosis of typhobacillosis these laboratory methods supply clinical medicine with indispensable and even invaluable assistance in forming an opinion. They enable us to eliminate the diagnosis of typhoid fever, and in many instances actually to put our hand on the causative agent of the disease, the tubercle bacillus.

We can even add to these different proofs of the individuality of the disorder of which we are speaking, an additional one, and say that by experimentation it has been possible to reproduce in animals

its different anatomical changes, with their gradual evolution and development.

In 1883 Yersin showed that rabbits, after venous inoculation of cultures of tubercle bacilli taken from birds, succumb in a period varying between twelve and twenty-seven days, after presenting the symptoms of an acute infection: fever, prostration and loss of flesh. At postmortem nothing more is found than congestive and degenerative lesions, without granulations or macroscopic tubercles. Similar results have since been obtained by other experimenters.

At a more recent period Gougerot has succeeded in creating in rabbits in a still more complete form the anatomoclinical state of typhobacillosis with its usual evolution. Not only has he reproduced, as did Yersin, the rapidly fatal form, with post-mortem granulations as exceptional occurrences, but he succeeded in obtaining the form that is usual in man, with an evolution in two stages: first the acute typhoid phase that seems to get well; and then, after a varying period of remission, acute or chronic tuberculosis, with the usual caseous lesions. In one case Gougerot observed that a rabbit, inoculated in the vein of the ear, showed an acute phase of typhobacillosis, and then recovered definitely.

These experiments, by creating the different forms of the evolution of typhobacillosis, have furnished remarkable instances of the succession in the same animal of different types of infection due to Koch's bacillus: after a period of typhobacillosis, with lesions of Yersin's type (that is to say, without follicular production); the animals die of tuberculosis, with lesions of Villemin's type (that is to say, after giving rise to follicles). To use the expression of Gougerot: "Villemin's type follows Yersin's type; just as in human typhobacillosis, Laennec's type follows Landouzy's type."

It does not seem likely that after these new proofs supplied by the research of laboratory and by experimentation, the reality of the disorder described by me under the name of typhobacillosis, or of bacillary, non-granular fever of a typhoid form, will continue to be held in doubt. This denomination has the advantage of being, according to the encyclopædic method, rather a short description than a definition, since it comprises at the same time the ideas that we have both of the etiology, pathogenesis, pathological anatomy and symptomatology of typhobacillosis.

Surgery

NERVE GRAFTING IN FACIAL PARALYSIS: REPORT OF A CASE

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Few deformities are more distressing than the distortion of the features from paralysis of the facial nerve; and if it happen to have been produced through operative intervention, the affliction of the surgeon may even approximate that of the patient.

It is extremely unpleasant to have one's face constantly pulling over to one side, the corner of the mouth drooping, the eyebrow depressed, and the natural wrinkles of the cheek and forehead absent. A smile under such circumstances is almost repulsive, and an attempt to close the affected eye produces a ghastly aspect, from rolling up of the ball and exposure of the white sclerotic between the partially open lids. The actual discomfort is also considerable, because one cannot talk, whistle or eat with satisfaction; while the inability to close the eye leads to annoying epiphora and troublesome inflammatory conditions.

Until recently there was no hope for many of these sufferers. The later advancements in surgery, however, have demonstrated that much relief can be obtained by anastomosis of the distal extremity of the facial with some other motor nerve, such as the hypoglossal or the spinal-accessory. This was first done by Mr. C. A. Ballance, of London, in 1895, and shortly afterwards by Körte, Kennedy, and Faure. Since then the procedure has gained acceptance but slowly, although a sufficient number of operations have been done to establish its feasibility beyond question. It is not always completely successful, but enough improvement is generally obtained to justify fully the operation from the standpoint of both surgeon and patient, even if no more is gained than the

return of tonicity to the flabby muscles, with restoration of the symmetry of the face. If the eye can also be closed, thus doing away with the harassing epiphora, the result may indeed be called satisfactory.

The operation is indicated in all cases of permanent facial paralysis, being particularly successful in those due to traumatism, —operative or otherwise. When interstitial neuritis is the cause, the outcome is said to be less encouraging.

Several brilliant results have been achieved in convulsive tic. The writer had the pleasure of examining such a case, exhibited one year after operation, by Harvey Cushing, at a meeting of the American Surgical Association. The result was almost perfect, even as regarded emotional expression, which is usually more or less unsatisfactory.

The time which should elapse before operative intervention is decided upon is of paramount importance, because it is well known that a tendency to spontaneous recovery is manifested in many cases. If, however, the nerve is known to be divided, an operation should be done as soon as possible, thus anticipating the degenerative muscular changes which are so detrimental to a satisfactory result. In fact the unusual success in convulsive tic may largely be due to the fact that anastomosis is done as soon as the facial nerve is divided.

When there is doubt as to the permanence of the lesion, there should be a delay of from three to six months, the shorter time being approached when the degeneration of muscles is unusually rapid. During this period of waiting, electricity, massage, and attempts at voluntary movements should be industriously employed in order to promote spontaneous regeneration, and, if this fail, to keep the parts in the best condition for subsequent grafting.

It is asserted by some that it is useless to intervene after the electric contractility of the muscles has disappeared; but, admitting that this may be true, it must be remembered that recoveries after operation have been reported in cases of 8, 12, and even 29 years standing; so that it is questionable, with our present knowledge, whether we should regard any case as hopeless, especially when we consider that even a moderate improvement is worth trying for.

When an operation is decided upon, both surgeon and patient

should clearly understand that results must not be expected too soon. In fact, improvement seldom begins in less than three months, and is often delayed for six months or even much longer. This corresponds well with the "axone theory," according to which the ganglionic filaments of the new nerve must have time to penetrate through the length of the paralyzed segment. In this connection it is difficult, however, to explain such cases as those reported by Bardenheuer, who obtained good results in one instance at the end of two and one half weeks, and in another after but five days, although in the latter paralysis had existed for sixteen years! In further support of the theory that nerve-fibres do not directly reunite after division, the writer can mention a case in which he sutured the facial, after its division a week previously during an operation for the removal of tuberculous glands. Although recovery up to a certain point gradually took place, it was extremely slow, and required fully as much time as if an anastomosis to some other nerve had been done.

Although Schäffer has suggested the use of the glossopharyngeal for anastomosis with the facial, nearly all operators have employed the spinal-accessory or the hypoglossal; but so far as we know at present the selection of one or the other of these nerves seems to be made more from mere choice or expediency than for any other reason, because good results have been obtained with both. An objection to the spinal-accessory is the subsequent atrophy of the trapezius and sternomastoid muscles, with drooping of the shoulder and a certain limitation of movement, which, however, is not great. But the main difficulty lies in the distressing fact that contraction of the facial muscles is apt to be accompanied by a jerking upward of the shoulder. The employment of the hypoglossal is also associated with annoying features, consisting of hemiatrophy of the tongue, difficulties in speech and deglutition, and movements of the tongue in unison with those of the face.

With either spinal-accessory or hypoglossal, however, these phenomena tend to disappear in the course of time, although seldom completely; the final result being largely governed by the age and adaptability of the patient and the energy and persistency of the after-treatment.

Several methods have been suggested for the avoidance of these

objectionable complications; for instance, the insertion of the divided facial into a slit in the other nerve without disturbing its continuity. This, however, is often difficult from the shortness of the facial stump, and in all anastomoses of nerves, any degree of tension is highly detrimental. And, furthermore, there is reason to believe that the result might be inferior, owing to the increased difficulty which the nerve would experience in changing its seat of activity from the tongue or shoulder to the face. Another method, also subject to the latter objection, consists in the splitting of a flap from the new nerve long enough to be easily attached to the facial. This certainly does away with tension, but it is generally an extremely delicate procedure which may result in ruin to the nerve, as will be admitted by every one who has attempted it. If the spinal-accessory is chosen, paralysis of the sternomastoid may be avoided by dividing the nerve beyond the point where the branch to that muscle is given off.

In view of the fact that in many instances of facial paralysis it is so difficult to say that restitution will never take place—cases being on record where this has occurred after many years—it seems clear to the writer that whatever else is done, the facial should seldom if ever be completely severed, thus giving the patient every possible benefit from this source. In other words, the new nerve should always be attached to the undivided facial, by inserting it within a split or suturing it to a flap.

An argument in favor of the hypoglossal is adduced from the fact that the tongue is more closely associated with the movements of the face, both centrally and peripherally, than is the shoulder, thus permitting its nerve to change its function more readily. There is possibly some truth in this, but, however that may be, it is true that associated movements of the tongue are effectually hidden within the mouth, while those of the shoulder are quite conspicuous. The difficulties of speech, due to hemiatrophy of the tongue, are without question extremely objectionable while they last, but they are often not great and fortunately have a tendency towards ultimate disappearance. Although there are objections to every method, it is probably better to employ the hypoglossal than the spinal-accessory, dividing it completely and inserting its proximal end into a slit in the undivided facial.

The operation must be thoroughly aseptic, because suppuration not only endangers the anastomosis directly, but may destroy its utility later by the production of contracting scar-tissue. The incision should be ample,—from well up on the mastoid to the superior border of the thyroid cartilage. The nerves must be handled with the greatest care, especially the facial, owing to its comparatively delicate structure.

The really difficult part of the operation lies in locating and uncovering the facial, and in this surgeons sometimes fail, or they so injure the nerve as to endanger the chance of success. Many operators have adopted the rather uncertain method of dissecting slowly down between the jaw and the mastoid, trusting to luck to strike the nerve. Others prefer to look for it as it comes out of the stylomastoid foramen—a difficult procedure owing to the depth. Cushing recommends cutting carefully through the lower part of the parotid until a portion of the nerve is encountered and followed down to its trunk; which process may be difficult to accomplish, on account of hemorrhage, and can easily lead to injury of the nerve.

The writer desires to call attention to an apparently simple and satisfactory method employed by him, which consists in freeing the lower portion of the parotid and pulling it forcibly upward and inward with a sharp-hooked retractor, thus putting the facial so strongly on the stretch that it can be recognized and uncovered with comparative ease. During the dissection, however, it is well to expose the division of the nerve within the glandular substance, in order to avoid a possible mistake.

After a successful operation, the first thing noticed is the return of muscular tonicity, manifesting itself in a restoration of facial symmetry during repose. Then appears voluntary movement, often inadequate and jerky in the beginning. Last of all come the movements in response to emotional excitement, such as laughing and crying. These are often obtained but partially or not at all, patients frequently being able to contract the muscles at will, although their laugh is still one-sided; nevertheless the improvement may be considered substantial and satisfactory.

In the case herewith reported, that of a young woman, the facial nerve was injured at its exit from the stylomastoid foramen while

scraping out an old sinus (resulting from a von Bezold's abscess) and chiselling away the lower part of the mastoid process. The division of the nerve was evidently complete and resulted in immediate paralysis. The face rapidly became drawn to the opposite side, the corner of the mouth drooped, the wrinkles of the forehead and cheek vanished, and the eyelids remained partially open, attempts at closure being accompanied by turning up of the eyeball, with unsightly exposure of the white sclerotic. The resulting epiphora was very distressing, especially upon exposure to wind or cold, and the conjunctiva became red and inflamed.

At the end of three months, on January 26, 1906, the condition having grown steadily worse and fear being entertained for the integrity of the muscles, the hypoglossal was completely divided near the tip of the hyoid and its proximal end carried up beneath the posterior belly of the digastric and sutured into a small slit in the trunk of the undivided facial just prior to its division within the parotid gland. Fine strands of silk from a twisted suture were employed for this purpose, catching the sheaths of the nerves only, care being taken to place the end of the hypoglossal exactly within the slit. There was no tension and primary union was obtained. During the operation it was noticed that the distal end of the facial was lost in the scar-tissue of the old von Bezold's abscess in the vicinity of the stylomastoid foramen.

In about three months the corner of the mouth could be voluntarily moved, and the symmetry of the face during repose had largely returned. In four months the cheek-muscles could be contracted quite easily and the facial symmetry was complete, although closure of the eye was still impossible and the epiphora was distressing. A moderate thickness of speech, which was at first present and due to atrophy of the tongue, gradually improved until it finally disappeared.

Further progressive improvement has taken place up to the present time (a period of two years and ten months), and is still going on. The eye can now be closed, and there is no epiphora or congestion. The face is symmetrical in repose, and the features normal. Voluntary movements of the cheek-muscles are marked, but the "emotional movements" are deficient. It is worthy of note, however, that all motion is somewhat spasmodic, especially

when the patient is under close observation. Wrinkling of the forehead still remains absent, and the eyebrow is depressed.

Improvement would undoubtedly have been more rapid if massage and electricity had been thoroughly applied. Unfortunately this was not done, owing to the carelessness of the patient and to the distance at which she lived. The case, however, probably represents rather better than an average result—satisfactory enough to the patient and presenting possibilities of further improvement.

SUPPURATION IN APPENDICITIS

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THERE is perhaps some apology necessary for daring to speak to you upon so well-worn a subject as appendicitis. My reason for doing so is that in spite of all that has been written about it, the fundamental character of the disease, upon which its very great danger depends, has not been generally understood or appreciated. It is to direct attention to this and its consequences that I shall speak.

To begin at the very beginning, what is the origin of the disease? In the great majority of instances, but not all, the meconium in the intestines of the new-born is sterile, containing no microorganisms. From birth onwards to the time of our death our alimentary tracts are invaded and flooded with microorganisms. These organisms will collect at such parts where there is delay in the passage of food débris, some products of digestion always remaining and only a little escaping from time to time. Such conditions will allow the great majority of the microorganisms to remain and multiply. The passage of food débris along the œsophagus, small and large intestines is intermittent but steady. Pauses, or rests, in the food transmission along the alimentary canal are found: first of all, in the stomach to allow of gastric digestion; and, secondly, in the cæcum to allow of the contents of the small intestine becoming more solid for passage along the large intestine, by the absorption of water and the deposition of mucus; thirdly, the food débris collects in the lower part of the large intestine before its expulsion. These are the three situations in which the conditions are such that microorganisms might grow and multiply.

We must now see how experimental investigations bear on these suggestions. It has been found by enumerating the colonies of organisms grown from the different parts of the alimentary tract that bacteria are "more frequent by hundreds and thousands" in the

cæcum than in any other part. (For further information reference must be made to my Erasmus Wilson lectures, "Clinical and Pathological Observations on Acute Abdominal Disease," pp. 33-37, published by Constable & Co.) It is a further and obvious conclusion that any organisms gaining admission to our alimentary tract will tend to multiply and increase in the cæcum. Therefore, if there happen to be harmful organisms amongst them it will be in this situation that they are most likely to do harm. To meet the pressing need of such dangers Nature has made an organ, atrophied from disuse, take upon itself another function; the appendix (and cæcum) has developed an enormous amount of lymphoid tissue to supply leucocytes to guard the interests of the part against the harmful microorganisms which are likely to congregate there. In fact our ileocæcal region may be compared to Trafalgar Square and the neighboring lymphoid tissue to Scotland Yard as it dispatches policemen to guard the interests of the community against the actions of any harmful rabble which may collect in the square.

The consequence of all this is that every case of appendicitis, however it may be originated, is associated with the presence of myriads of microorganisms. In this connection, with inflammation, even organisms such as the bacillus coli, which is probably beneficial to us in health, are changed in their disposition and become extremely dangerous to us. It must now be obvious that, fundamentally, appendicitis is a septic disease.

One of the most important methods, of easy application, to watch the clinical course of a case is by means of the temperature chart. And I would base the following argument on its study. Dr. H. P. Hawkins,¹ in describing an attack of appendicitis which ends in resolution, says "the common duration of the fever is roughly from six to ten days." Sir Watson Cheyne² says that "where an acute inflammation has lasted for four or five days, it is almost certain that pus is present." Here these two remarks have to be construed in the light of appendicitis being an acute septic disease in which both the fever and the septic microorganisms are present. If such a disease is active, for even four or five days, pus must be present and one reaches what is in reality an obvious conclusion that sup-

¹ Diseases of the Appendix (Macmillan).

² Treves' System of Surgery, article "Suppuration" (Cassell).

puration is very common in inflammation of the appendix. But in cases in which the disease settles down and is said to resolve, what may be called typical resolving appendicitis, what becomes of the pus? The heat generated, as for example by the fire, in the surroundings is greatest nearest the source of that heat. Similarly, as the infection takes place from within the appendix, the results of the infection will first affect its inner coat, the resulting pus discharging via the appendix into the cæcum where it is mixed with the fæces, hidden, and passed per rectum unnoticed. This is the natural history of cases of "medical" appendicitis. It is only when the internal discharge of the suppuration is inadequate that it is necessary to aid the process of the evacuation of the pus by means of an incision.

To sum up, the best method of deciding if inflammation of the appendix is accompanied by suppuration is the character and duration of the fever. If the fever lasts four or five days, pus is present. In cases not demanding operation, the pus is probably discharged via the appendix itself.

Besides the temperature there is a physical sign which I believe is never, or rarely ever, found unless pus is present. This is a mass in the right iliac fossa, composed of inflamed bowel, omentum, etc., round the appendix.

Both the temperature and the physical characters of this mass change whether the abscess is discharging satisfactorily or not. For instance when an abscess cavity is not discharging, the temperature is high and the abdominal mass is not well defined. When an abscess is discharging freely the temperature falls and the abdominal mass becomes more easily palpable, handled, and its outlines defined.

To exemplify this theory in practice I will quote a case.

A child aged thirteen, had had at least one previous attack of appendicitis; when she was seen she was suffering from an acute attack consequent to measles. On the fourth day the temperature fell to normal and the general symptoms subsided. By the eighth day the temperature had risen again to 102.6° , and an ill-defined mass was apparent in the abdomen, the girl again becoming ill. We met next morning to incise the abscess, but

1. The temperature had come down to between 99° and 100° ,

2. The subjective symptoms of the patient were much better.
3. The abdomen was less tender and painful.
4. The mass in the abdomen, which had hitherto been ill-defined, was now easily outlined and handled.
5. There had been a sudden cessation of pain followed by the passage of—
6. Two spontaneous stools with tenesmus, the bowels hitherto having been confined.
7. The first stool was more or less normal, the second copious, loose, slimy and offensive.

No operation was performed. In a few days, however, it became imperative to open the abscess, a temporary fecal fistula resulting from the aperture through which the pus had escaped internally. The convalescence was without incident. Had the signs of the discharge of the abscess into the bowel been less definite, the case would have been regarded as one of non-suppurative or medical appendicitis.

Another question presents itself for answer. The internal discharge of an abscess takes place most frequently via the appendix, but is this the only internal route which the discharge takes? A careful examination of the walls of appendiceal abscesses during operation revealed the fact that with a probe one could find perforations into the small bowel three times as frequently as perforations into the cæcum.⁸ So that arranging the routes of the discharge in order of their frequency, the appendix comes first and explains the nearly hundred per cent. of cases of resolving or "medical" appendicitis; then comes the small bowel; thirdly, the cæcum; fourthly, the pelvic viscera, the bladder, vagina, and rectum; lastly, the rarities, such as the gall-bladder, the ureter, etc.

When the internal discharge of the pus is inadequate, a so-called appendiceal abscess is formed and demands incision. In examining a series of appendiceal abscesses small holes were often found in surrounding hollow viscera, through which the abscess had attempted to discharge itself. For instance, I have stated here and elsewhere that I found that these sinuses lead more often into the small bowel than into the cæcum. As a consequence, a fecal fistula, which only lasts a few days, is in reality common after the opening of an appen-

⁸ Corner: loc. cit., p. 40 *et seq.*

diceal abscess. This is a clinical observation easily made by watching the odor and character of the discharge from an appendiceal abscess after it has been opened. These fistulæ have some clinical importance.

a. Occasionally they refuse to heal, leaving a persistent fecal fistula after the abscess has discharged externally. I have had to operate on four such cases; three were small bowel fistulæ and one was of the cæcum.

b. The fistulæ may also persist after the abscess has discharged internally, so that they become a very important factor in the removal of an appendix in the quiet interval after a severe attack. For if the fistula has remained unhealed and has been unnoticed at the operation, the indication is that perforation has been left open, and the patient will die of general peritonitis. I regret to state that I have lost two patients by such an oversight. On the other hand, I have frequently demonstrated the presence of the fistulous hole by means of a probe during an operation for appendectomy. The holes are sometimes multiple and when very small need not kill the patient if not sewn up, though a very grave and unjustifiable risk is incurred by not doing so.

c. These fistulæ allow of the internal and spontaneous discharge of an appendiceal abscess.

d. They allow the formation of another kind of abscess, which has stiff walls and contains thin brownish pus which often has little or no smell. Such contents are intestinal contents which have gained access to the abscess cavity by way of the same hole through which the pus escaped. The clinical history of such a case is typical. First of all there is an attack of appendicitis accompanied by the signs and symptoms of an appendiceal abscess, which becomes evacuated internally, the temperature falling and the abdominal mass becoming defined. Later, perhaps two or three days, the temperature again rises and the abdominal mass again becomes tender and ill-defined. The explanation is that there is either a recrudescence of the appendiceal abscess or an abscess of intestinal contents, an intestinal abscess.⁴ The case already quoted in this paper exemplifies the point.

The last question to be brought before you is the question of

⁴Loc. cit., pp. 47-48. (Corner).

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operation as viewed in the light of the very great frequency of abscess or suppuration in appendicitis. In acute stages, operation is done mainly for three reasons: to save life, to cut short an attack, and to evacuate pus from an abscess. In the "quiet interval" we operate mainly to prevent the danger and disablement of future attacks or the persistence of mild symptoms. That is to say, we operate mainly for urgent practical reasons in the acute period and mainly for theoretical reasons (prophesies) in the quiet interval. Now, after an appendiceal abscess has been opened, are we to remove the appendix? If a patient has had a severe attack, probably due to an abscess discharging internally, it is advised usually that the appendix shall be removed in the quiet interval after the attack. But if, instead of discharging internally, the abscess has to be opened, discharging externally, it is customary not to advise the removal of the appendix. In both cases there has been abscess formation; why the different advice? The main difference between the cases is that when the abscess had to be opened there was "something" which prevented the internal discharge of the abscess.

Now if suppuration in the form of abscess is common in appendicitis, any number of appendices are removed, after suppuration has occurred, by surgeons who would never perform this operation after opening an abscess. This is an unconscious travesty of their precepts. Personally, I think that similar advice should be given whether an abscess has had to be opened or not; it is safer to remove the appendix. If an abscess has been opened or has discharged internally, it is better to wait for the wound to heal and perform the second operation a few weeks later. So that it works out in practice that the appendix is removed whenever the wound made for opening the abscess does not heal or the patient has further trouble. If such advice is given, it is astonishing how few people require the appendix to be removed after an appendix abscess has been opened. May we not pursue a similar course after an appendiceal abscess has discharged internally? In this case is there actual necessity to remove the appendix? My own feeling is that in the future we shall remove far more acutely inflamed appendices and fewer appendices in the quiet interval. One word more, as to the removal of the appendix at the operation when the abscess is opened. It can often be done with safety, but, in general, it is safer not to do

so. A surgeon is probably wise not to do so unless the appendix makes its presence very obvious or the abscess is very small and is approached after the peritoneum has been opened, the operation area being "packed off" and under complete control.

The contentions of this paper may be summed up briefly as follows: suppuration is almost universal in appendicitis, in cases getting well without the need of operation the pus is discharged almost always via the appendix, if the temperature is raised for as long as four days pus is present, if there is a mass in the abdomen pus is present often discharging satisfactorily internally about three times as often into the small bowel as into the cæcum; that temporary fecal fistulæ are common with appendix abscess; that if such fistulæ communicate with a hollow viscus and persist, they are a great danger in the operation of appendectomy done in the "quiet interval"; a fistulous opening in the bowel may lead to an intestinal abscess; that operation be done for signs and symptoms rather than for "evil prophecies"; that in the future far more operations will be done in the acute stage and less in the quiet stage; that too small an incision must never be used through which to remove an appendix in the quiet interval; that appendicitis owes its danger to its septic character, and the presence of pus is not necessarily an indication for operation, its presence being almost universal in the disease.

EXCISION OF THE HIP-JOINT IN ARTHRITIS DEFORMANS

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At the present time, when aseptic methods have become so perfect and make wound repair almost certain, it is at least well to endeavor to relieve the intense pain and functional disturbances arising in patients suffering from arthritis deformans. Excision of the diseased joint is indicated when medical treatment proves of no avail. Although one may assume that more of these cases have been operated on than have been reported, still the reserve which surgeons have shown in speaking of these cases has given rise to much thought on the subject. It is therefore worth while to investigate the value of the results obtained by excision, as well as to consider the indications for this surgical interference. Of special interest is excision of the hip-joint: first because arthritis deformans preferably attacks this joint; and secondly, because in this joint the object aimed at is to obtain the best functional results possible.

Before discussing this subject, however, I shall endeavor to give a clear idea of the character of arthritis deformans, the pathological changes, the etiology, and the clinical course, as otherwise one would be unable to judge the value of therapeutic methods.

In medical literature there is probably no other affection which has given rise to so many various opinions, or such a confusion of ideas, as has the affection under consideration. The large number of synonyms mentioned by Heuter in his work on diseases of the joints is significant. Besides arthritis deformans, the following names are given: arthritis nodosa and sicca, rheumatismus nodosus, arthroxerosis, malum senile; while others adopt the terms of arthritis spuria, arthritis pauperum, arthritis rheumatoides, polypanarthritis, gouty rheumatism, chronic rheumatic inflammation of the joints, rheumatic gout, or chronic hyperplastic chondritis. On account of these numerous names, a complete conception of this disease is ren-

dered extremely difficult. Many of these are based upon a much disputed etiology, and only a few of them indicate the pathological process. The latter are the only ones to be considered, because they indicate the character of the pathological process and tend to clear up the existing doubtful conceptions.

The anatomical characteristic of arthritis deformans is, according to Ziessler, a primary degeneration of the cartilage with disappearance of the bone elements, followed by a secondary bone formation which becomes separated from the atrophic bone, partly from a destructive process in the cartilage, partly from a bending or a fracture of the atrophic bone. In the cartilage, the process commences with a localized erosion, and the eroded portions become atrophied and finally disappear; then becoming separated the subchondral bone takes their place functionally, becoming smooth and shiny. From the borders of the joint surface, a peculiar neo-osseous process develops, variable as to size, while later on these outgrowths intermingle with each other, so that motion is interfered with.

During this process the articulation gradually wears away, this resulting from the movements of the joint; and, in the case of the hip, as the result of the friction produced during flexion, the ball-and-socket joint is often transformed into a pronounced cylindrical joint.

Interference with motion is increased, the joint surface continues to disappear, the vegetations on the edges increase and interlock when the patient walks. The surface of the joint gradually becomes less rounded, this corresponding to the diminished motion, and finally only a surface with a broad border of preformed tissue remains; the head of the femur becomes mushroom-shaped and soon is narrower over its articular surface, so that finally only a stump of smooth, polished surface is left.

In the meantime, the articular capsule has become involved in the new growth. It appears thickened, while numerous and variously-shaped protuberances have developed and layers of cartilage and bone have formed in them. These vegetations on the border often become loosened and form foreign bodies in the joint. The exuberant synovial membrane finally shrinks, although it does not give rise to adhesions or obliteration of the joint.

In this manner, on account of the changes arising in the cartilage and bone, enchondroses and exostoses are formed, resulting in extreme deformity in the joint, and, by overcoming the degenerative processes, leading to dislocation; while on the other hand, by overcoming the hyperplastic process, the final result may be a complete loss of motion.

In that form of this affection which has been termed *malum senile* and which Ziegler calls *arthritis chronica ulcerosa sicca*, the destructive manifestations are less marked, while the disappearance of the articular elements is the principal characteristic.

As I have already mentioned, arthritis deformans is more prone to occur in the hip-joint, but it may be encountered in the knee, shoulder or elbow, the fingers, and the vertebræ. Thus we may have a mono-articular or a polyarticular form according to the number of joints involved in the process. Now, although surgical interference is more commonly indicated in the mono-articular type, it is proper to consider also the polyarticular type, especially so because of certain relations existing in the etiology of both.

In general, the etiology of arthritis deformans is quite problematical and has given rise to many opinions. Volkmann believes that as far as the polyarticular type is concerned, a type which he believes occurs most frequently, there is a senile disturbance appearing with other evidences of advanced years, namely, a sclerotic process in the muscles and tendons as well as atheroma of the blood-vessels. Other writers uphold that arthritis deformans is the result of an infection, particularly gonorrhœa; and they endeavor to prove this hypothesis, which I believe is questionable, from the fact that the disease frequently occurs in the knee-joint, which is usually the one commonly involved in gonorrhœa.

In his work on constitutional diseases, Hofmann, after a critical investigation on rheumatism and arthritis deformans, says that the latter should not be considered a disease *sui generis*, but that usually it is the final stage of chronic rheumatism or some inflammatory process in the joint. It is also said to be due to influences arising from certain occupations, likewise the age and sex, unfavorable conditions of living, and rheumatic lesions. Just how much the assumption of those writers is justified who term the process arthritis pauperum, is doubtful. Cases do not seem to occur without some

predisposing influence. Charcot's opinion is likewise untenable, namely, that arthritis deformans often depends upon some primary disease of the central nervous system, especially of the spinal cord, in other words that, to a certain extent, it is dependent upon tropho-neurotic disturbances. He endeavors to prove this by pointing out that these joint lesions are met with in *tabes dorsalis*. However, this explanation of the pathological appearances is not entirely free from objection.

On the one hand, a diminished sensibility or external mechanical influences acting on the joint may not be noticed by the patient, while on the other, the ataxic movements may finally lead to a chronic anatomical irritation in the joint. Be this as it may, Strumpell has reported a case of marked arthritis deformans which showed no microscopical changes in the cord, and in this case at least it would show that one should not be too hasty in assuming that the trophic centres had anything to do with the etiology.

In the majority of cases trauma is probably the exciting cause in the mono-articular form of arthritis deformans. That a mechanical irritation alone cannot be held responsible for the development of this disease is shown by the fact that in only a comparatively few cases is there a history of traumatism. Usually there is evidence of some other chronic inflammatory condition present, and it may therefore be assumed that, as far as the development of this affection is concerned, a certain predisposition must exist along with the chronic irritation. This predisposition would seem to be an inherited one, for several times it has been observed that a number of members of the same family developed arthritis deformans after receiving some slight injury to a joint.

However, even when traumatism can be excluded in the etiology and the affection attributed to causes other than those above mentioned, it is not improbable that there nevertheless exists a predisposition in the patient. If we sum up all the hypotheses concerning the development of arthritis deformans, it would seem rational to conclude that any form of chronic irritation acting upon a joint may lead to its development, provided the patient presents a predisposition for it.

The clinical course of arthritis deformans is usually very chronic and may extend over a great number of years. The disease ordi-

narily commences very gradually and proceeds slowly in its development. The patient will first complain of becoming easily tired in walking and feels pain in the joint which radiates around the ischiatic nerve. Soon after, a slight stiffness in the affected limb develops, which is particularly noticed when the joint has been at rest for some time; consequently, the patient suffers more at the time of waking in the morning.

Active and passive motion is at first unlimited, but then it becomes diminished in the joint involved. This limitation of motion is the result of pain experienced in active movement, as well as of a certain interference of the muscles. Later on the limitation of movement is due to the mechanical obstacles resulting from the development of the pathological process as well as atrophy of the muscles. Motion becomes more and more restricted, the pain increases, and a peculiar cracking and grating sound may be detected in the joint. Abduction and adduction become impossible, while rotation is very limited. In severe cases flexion also becomes gradually lessened and in time a more or less complete stiffening of the hip results.

Objective changes in a diseased joint occur relatively late in the process. Not infrequently it appears swollen and thickened, and occasionally there is a slight shortening of the limb. The disease is not usually accompanied by a rise of temperature nor by any marked disturbance in the general health of the patient.

Nevertheless, the prognosis is unfavorable, and if cures are obtained at all they are extremely rare and only possible when the case has been treated very early in its progress. Death finally results, either from increasing general exhaustion, or from some intercurrent complication.

The ideal treatment can only be undertaken if the cause of the process can be reached, but as this is not the case it is limited to relieving the symptoms. Though it is beyond our power to cause a new formation of cartilage to develop on the bone surface, and as it is impossible to reconstruct the joint after atrophy has occurred in it and the surrounding structures or to do away with the vegetative processes arising on the edges of the joint, one may at least endeavor to relieve the pain, and, as far as possible, remove the cause of the obstruction to motion. The mineral waters, such as one finds

at Wiesbaden, Teplitz, Wildbad, Buxton, or Gastein, may in some cases do away with a certain number of symptoms, such as the pain and synovitis, and in this way arrest the progress of the disease, but in no way do they affect the progressive changes in the joint. It is very difficult to believe seriously that the small doses of potassium iodide, a remedy frequently given, can have any definite effect upon the course of this disease.

In early and not too advanced stages regular continued motions of not too long duration may result in preventing the head of the femur from becoming rapidly changed and resulting in a cylindrical joint. If during these active or passive movements, symptoms of irritation with an increase of pain should arise, the movements must be interrupted. Much relief may be given the patient by the application of Hessing's apparatus, and massage may sometimes have a favorable, though unfortunately not permanent result, when combined with other local methods of treatment. Massage tends to increase the range of motion, and by strengthening the muscles freer movement may be obtained and the general health bettered. In more advanced cases, however, where the pain has become unbearable, the above treatment is inadequate. One should hesitate before prescribing narcotics, especially morphine, on account of the long duration of the affection.

For these severe cases which greatly interfere with the bodily functions Volkmann was the first to suggest excision of the hip-joint, not alone to relieve pain but with the idea of replacing the functions of the joint. At that time a case of resection of the hip-joint was recorded by Fock. A workman forty-nine years of age gradually developed an arthritis deformans in the left hip-joint following a traumatism. As the various medical measures in no way influenced the pain, and as shortening and flexion of the limb became more and more pronounced and motion in the hip-joint had become impossible as a result of the muscular tension, it was decided to resort to excision. The upper end of the femur was cut through with a chain saw below the great trochanter. The wound healed without reaction, but in the eighth week erysipelas developed, which extended throughout the entire limb, reaching the foot. This was recovered from and ten weeks after the operation the patient was allowed to be up and around on crutches. The pain, which had

lasted a few weeks following the operation, entirely disappeared in time, and passive motion in all directions became possible, abduction being the least free. Active motion, which was at first very difficult, could be accomplished only to a slight degree on account of muscular weakness, but this improved so that when the patient was discharged he could step fairly well, although he still used crutches. Kuster recorded a case in 1877 where the outcome was more favorable than in the above case. A boy sixteen years of age sustained a dislocation of the left hip, and although this was immediately reduced, pain in the hip-joint rapidly developed. The limb appeared shortened and outwardly rotated; the head of the femur could be felt moving anteriorly and inwardly towards the pubis. The patient was quite lame. The diagnosis of incomplete pubic dislocation was made, the dislocation being supposed to be a result of fracture of the border of the acetabulum; and since several unsuccessful attempts to improve the position had been made under narcosis, it was decided to make an exploratory incision of the hip-joint. It was found that the patient presented an advanced arthritis deformans and the displacement of the head of the femur was due to an enlargement of the acetabulum. Given these circumstances, excision seemed advisable to put a stop to the process. In spite of the fact that the wound became infected, resulting in a very obstinate fistula, Kuster reported that favorable functional results were obtained seven months after the patient had been discharged. The joint became movable and useful, and walking was accomplished without a limp by the use of a high-sole heel.

Zesas reports a case operated on by Niehaus. The patient, a male fifty-nine years of age, was suddenly seized with pain in the right hip without any apparent cause, and although he was able to walk without a cane, he applied for treatment on account of the severity of the pain. The patient received injections of 5 per cent. solution of carbolic acid, but as this did not improve the condition, operation was decided upon. The greatly deformed head of the femur was excised below the trochanter. Here again the wound became infected, but no serious results ensued. After the infection had been overcome the pain in the joint diminished, the appetite and strength improved, and in about two months after the operation

the patient could walk with the aid of crutches. Although the pain in the joint remained, it was very slight, as examination showed two and a half years later, and gave no cause for complaint; still there was very little power of function in spite of massage and electricity. The patient was unable to walk without crutches.

A similar unfavorable functional result was obtained in a case operated on by Schönborn. The patient, a farmer sixty-nine years of age, had suffered for fifteen years with pain in the right hip-joint when walking. He was of the opinion that the pain originated at a time when he carried a heavy sac while sowing seed, which had always produced pressure on the right hip. Without cause the suffering increased. A hard tumor developed in the region of the hip, while the pain finally reached such a pitch that the patient was unable to walk. After all medical treatment had failed he sought surgical relief. Upon examination the femur was found slightly adducted, rotated outwards, and shortened about 8 cm. The region of the trochanter major appeared thickened and broadened out, and extended distinctly above the Roser-Nélaton line. Only slight external rotation was possible, while internal rotation was impossible and, if forced, crepitation was distinctly felt. The pain was so severe and impossibility of motion in the hip-joint was so great that the patient was obliged to remain in bed. A diagnosis of arthritis deformans was made, with broadening of the acetabulum posteriorly, and excision was advised. On cutting down on the femur, as well as the acetabulum, it was found much altered, both showing the characteristic changes of arthritis deformans. The head of the femur was excised just below the trochanter major. The wound healed perfectly and four weeks later pressure over the joint gave rise to only slight pain. Two months after the operation the patient insisted upon leaving, and at this time active motion was possible, but still painful. Abduction and internal rotation still remained limited. Six months later the patient wrote that he was obliged to use crutches and that he still had pain in the hip-joint. Although the result in this case cannot be considered particularly good, it should be recalled that the patient left off treatment too soon, and that he was last heard from only six months after the operation.

Wishing to know what the principal authorities on surgery had

to say about excision of the hip-joint in arthritis deformans, I took at random the following authoritative works, with the following results. No mention is made of the surgical treatment by Wharton and Curtis in their "Practice of Surgery," 1898. Young, in his excellent work on "Orthopædic Surgery," although carefully discussing the medical treatment, makes no mention of the surgical treatment of this affection. In his article on diseases of the joints in the "System of Surgery" by Frederick Treves, vol. i, London, 1895, Mr. Arthur E. Barker, although giving considerable space to treatment of this affection, makes no intimation that there is any surgical relief afforded. Forgue does not refer to excision in his excellent "Pathologie Externe," vol. i, Paris, 1902, and although carefully considering the subject of arthritis deformans is silent on the operative treatment. Moore, in his work on "Orthopædic Surgery," published in 1898, says: "Excisions have been performed with satisfactory and unsatisfactory results," and thus disposes of the operative treatment. Joseph Ransohoff, writing on the diseases of the joints in the "Treatise on Surgery by American Authors," vol. i, 1896, says that "operative treatment is rarely called for, but in two excisions of the hip [presumably his own] in patients aged respectively seventeen and twenty-eight years, the result was very satisfactory." Thomson and Miles in their "Manual of Surgery," vol. i, Edinburgh, 1904, state that, "excision is only indicated in large joints when the disease is of an aggravated type, when it is mono-articular, and when the general condition of the patient is otherwise favorable." Further reference to modern works on surgery seems unnecessary, as the foregoing quotations and omissions in reference to the subject clearly show the attitude of surgeons towards surgical treatment of the mono-articular type of arthritis deformans.

As the subject of this paper has as yet received but relatively scanty notice, I will refer to a few more clinical histories of the disease where operation was undertaken, as several of them are of considerable interest; and I will in the first place report a hitherto unpublished case, for the notes of which I am indebted to Dr. C. G. Cumston of Boston.

A laborer, sixty-two years of age, had suffered for about eighteen months with pain in the right hip and right knee, the pain being particularly marked in the morning. It had come on apparently

without any cause, as neither a recent nor remote injury of the right limb could be found in the patient's history. After a carefully directed treatment by his family physician the pains continued to increase, and he was then advised to seek surgical advice and, if possible, relief. Upon examination it was found that the slightest movement in the hip-joint caused pain, and that even in the night the patient was aroused from his sleep by it. The right hip was flexed and slightly rotated outwards. The knee-joint likewise was somewhat flexed. Active motion was extremely limited in the hip-joint, while in the knee-joint complete active extension was impossible. Marked crepitation could be elicited in both joints. Passive motion in the knee was well preserved, but in the hip-joint it was practically no better than active motion. There was considerable tumefaction in the region of the right trochanter. As the pain in the hip-joint was increasing, resection was suggested, although the many disappointments in the results were clearly pointed out to the patient. At his request, however, excision was performed, the head of the femur and acetabulum presenting characteristic lesions of arthritis deformans. The wound healed by first intention, and in spite of careful extension, which was carried out for over three months, the limb still presented an external rotation and flexion. Under narcosis the flexion was reduced and a plaster cast applied. This was worn for several months, but without satisfactory results. A year later the patient began to suffer from his former symptoms and every attempt at motion resulted in severe pain both in the hip- and knee-joints. This case must be considered as a very unfavorable one, although the lesions and symptoms complained of by the patient were those indicating operative interference.

More encouraging results have been reported by Cornils in two cases operated on by Riedel, and a third one, which is of less importance because the patient died. The first case was a young girl who noted a gradual shortening and outward rotation of the right leg following trauma. On examination a real shortening of 4 cm. was found, besides a complete external rotation. The head of the femur was distinctly seen under the anterior iliac spine. While flexion could be accomplished, abduction, adduction, and internal rotation were interfered with. Excision of the head of the femur was resorted to and eight weeks later the wound completely healed. Two years later a very favorable outcome was noticed. The dis-

ease had not developed in the other joints, and the patient could easily walk about unaided, without pain or much fatigue. There was a slight limp, due to a true shortening amounting to 3.5 cm. Otherwise motion of the joint was almost as good as on the healthy side.

The second case was a laborer twenty-nine years of age, who a year previously had fallen from the second story of a building, striking on his left hip. On account of the severe pain and inability to walk he sought surgical relief. From the ankylosis, the enlargement of the trochanter, and the distinct crepitation in the joint when attempts at motion were made under narcosis, it was thought that the head of the femur had been impacted in the acetabulum. Fracture of the acetabulum was also considered. It was decided to do a cuneiform excision of the femur on its posterior aspect, but when the bone was exposed it presented marked evidences of arthritis deformans, so that excision through the middle of the neck of the femur was resorted to. In spite of the wound infection following, which required treatment for three months, the result was very satisfactory. Although there was 5.5 cm. shortening the patient could walk without pain, wearing a properly made shoe. Flexion, however, was extremely restricted.

The third case operated on by Riedel, I will not report, as the ultimate result of the operation is unknown because of the patient's death.

Two cases of resection for arthritis deformans which are of interest have been reported by Müller. Both patients were young. The first, a male thirty years of age, complained of pain in the left hip following a fall, which gradually increased until he was finally unable to work. The pain was especially marked on rising in the morning, and he frequently had cracking in the hip. Motion was so limited that it was with difficulty that he could walk with a cane. The diagnosis was tuberculosis of the hip, and excision advised and accepted. On cutting down on the capsule neither it nor the femur presented lesions of tuberculosis, and instead the discovery of polished surfaces, bony and cartilaginous outgrowths on the borders of the acetabulum, with depression and enlargement of the latter, and numerous small nodular outgrowths on the inner aspect of the capsule, showed the case to be a typical one of arthritis deformans. Protecting the muscular insertions on the great trochanter, the head

of the femur was excised at its neck, the acetabulum scraped out and the capsule resected as far as possible. The wound cavity was packed and drained with iodoform gauze and the limb placed in extension.

The pains gradually diminished so that the patient was allowed to walk after the sixth week. The patient left the hospital at the end of eleven weeks with limited motion in the hip-joint, but without pain. Two years later, however, he again complained of pain in the joint, but he could walk fairly well without a cane, and generally speaking the result was favorable. The second case was a patient thirty-three years of age, the lesion being caused by a trauma. For six weeks after his fall extension had been applied, and three months after the injury he could walk with crutches. As he continued to have considerable pain, especially when walking, he sought surgical relief a year later. Examination at this time showed that the left limb was somewhat adducted and with a slight inward rotation, with a flexion of 45° . Further flexion, active as well as passive, was limited; while rotation, abduction, and adduction could hardly be accomplished and gave rise to severe pain. Pressure over the joint was not painful. There was a natural shortening of nearly 4 cm., but no abscess. An indefinite resistance could be felt, however, in the region of the joint, and the diagnosis remained doubtful until the joint was explored by incision. The changes in the head and neck of the femur, as well as in the acetabulum, were those of arthritis deformans. Excision was carried out through the neck of the femur and the capsule of the joint was partially removed. The after-treatment instituted was extension. During the third week an abscess developed; but within eight weeks from the time of the operation the patient was allowed to walk, after which he rapidly improved. Three months after the operation he could walk with a cane without pain, but all motions were much restricted. A year later the patient complained of pain to a certain extent, but he could walk as well as before the operation.

Bennecke has reported the case of a female, forty-two years of age, having a congenital right-sided dislocation of the hip, which had given her considerable pain for the past two years following a fall. The pain became so intense that she was finally unable to walk. Besides the dislocation, with shortening of the right leg, distinct crepitation could be heard. After several weeks of unsuc-

cessful treatment by extension excision of the head of the femur was resorted to, presenting all the lesions of arthritis deformans. The femur was placed in abduction on the ilium. Fifteen months later she was able to bend forward without a crutch and could walk much better than before the operation without pain.

The following four cases recorded by König are remarkable in many respects. The first was a laborer sixty-four years of age who without any cause began to complain of pain in the right hip, which finally became so severe that walking was difficult. The foot was rotated outwards, the limb adducted, and the pelvis lowered. In spite of this there was 2 cm. shortening. Only flexion was possible, and this was accomplished by an outward movement. Loud crepitation could be heard. On the anterior aspect of the neck of the femur a tumefaction could be felt. Excision of the neck of the femur and removal of the new formations around the borders of the acetabulum was accomplished, after which the head of the femur could be removed. Extension was carried out for two months and when the patient was discharged he could walk without pain with the limb in good position.

The second case was a man twenty years of age who developed arthritis deformans of the right hip following a fall from a horse. The affected limb was flexed, adducted, and outwardly rotated. There was an apparent shortening of 2 cm. and a true one of 3 cm. The head of the femur could be felt under the superior anterior spine. Movement was very painful, making walking almost impossible. After excision both walking and sitting were painless.

The third case was a female thirty-nine years of age, who developed an arthritis deformans in the right hip without any known cause. Motion was very limited and extremely painful; the leg was outwardly rotated and shortened 3 cm. As there was considerable tumefaction the diagnosis was not made until after the head of the femur had been exposed. The latter was resected and the capsule removed. Four months later she was discharged with a movable and painless joint. This improvement was apparently lasting.

The fourth case was a male fifty years of age, who had in his youth suffered from a right-sided hip-joint disease, which had left no trace; but at the age of forty-eight, he complained of such severe pain that he was unable to work. The hip-joint was slightly flexed,

adducted, and rotated outward; there was 3 cm. shortening, motion was very limited, rotation almost impossible. Behind was found a fluctuating area as large as a hen's egg. At operation this area was found to be a hydrops of the joint. Several pedunculated bodies were removed from the joint and the head of the femur excised near the trochanter. The patient was discharged cured, and ten years later he was still walking without pain. König also refers in his text-book to a successful case of excision of hip-joint for arthritis deformans in a girl seventeen years old, who was still perfectly well two years later.

The two following cases were reported in 1904 by Muszkat. A female sixty-two years of age had complained for two years of severe pain in the right hip, which of late had become so severe that she was unable to work, and at last she took to her bed. The affected limb was abducted and slightly flexed. Rotation was restricted and crepitation could be both heard and felt. Pressure on the joint caused pain. Excision of the head of the femur was performed, revealing characteristic lesions of arthritis deformans. The further course of events was unfavorable, as the limb became infected, the patient dying about two weeks later.

The second case was a male fifty-four years of age. He had always been well and came of a healthy family. He complained of pain in the right hip-joint, which occurred without any cause; and walking soon became difficult. On examination the limb was found in slight flexion, adduction, and external rotation. The patient could flex his leg slightly but could not rotate it. Passive motion was only slight and loud crepitation could be heard. On the inner side of the thigh near the adductor group a fluctuating swelling, the size of a small apple, could be detected. The skin covering it was somewhat tense and red, otherwise the region of the joint was normal. Numerous dry and moist râles could be heard on expiration. A diagnosis of arthritis deformans of the hip and para-articular abscess, probably of a tubercular nature, was made, a condition which was verified by excision. The capsule was very hyperæmic and presented several small grayish-red nodules. There was no fibrous thickening nor villous growths. On the convex aspect of the head of the femur there were several smooth, yellowish projections, from which the cartilage was completely removed. No tuberculous foci could be detected in the head or neck of the femur.

The acetabulum was somewhat depressed, and its cartilage was partially lacking and where it did exist it was thickened. No caries could be detected, and there was no fluid in the joint. Nevertheless, the swelling originated in the adductor region from a para-articular abscess, which was freely opened. The diseased portions of the synovial membrane were removed and the head of the femur excised near the trochanter; the wound was packed and extension applied. During convalescence secretion from the wound was profuse and the patient's temperature remained somewhat elevated; the pain in the joint was only slightly diminished, and he finally died of exhaustion.

Both these cases are characteristic on account of the complications. In the first there was an inflammatory process in the acetabulum and muscles surrounding the joint, which occurred at the time of the operation. As asepsis was carefully carried out it would seem hardly possible that the infection took place at the time of the operation or during the after treatment, and Muszkat is of the opinion that the joint, altered by disease, was itself a suitable nidus for the development of bacteria. The second case, however, he believes demonstrates that a joint the seat of arthritis deformans may offer favorable conditions for deposition of bacteria which already exist in the organism. Here, the tuberculous process which produced extensive changes in the lungs during after-treatment from the excision, had in all probability infected the site of operation, a *locus minoris resistentiæ* having been produced by the arthritis deformans. The simultaneous occurrence of these two processes is most unusual, because Volkmann has asserted that arthritis deformans is in all respects just the opposite from the fungous inflammatory processes in the joints. Usually elderly individuals are most subject to arthritis deformans, and this process proceeds without rise of temperature, while suppuration or caries never occurs. However, Poncet gives another possible explanation of the pathologic process, and at the Eleventh French Surgical Congress he described a condition of affairs which he termed *tuberculous deforming polyarthritis*, or *chronic pseudorheumatic deforming tuberculosis*, the etiology of which he attributes to tuberculosis. The characteristics of this process are more or less swelling of the diseased joints, with increasing deformity and gradual relaxation. There is no tendency to pus formation, no fungous growths; but the de-

formities present resemble arthritis deformans. In the differential diagnosis must be considered the distention of the joint capsule from the presence of soft masses of tissue, the extent of usefulness and deformity of the joint, and crepitation on passive motion. It is possible that Muszkat's second case was one of this type, and yet the description of Poncet's lesions does not completely correspond to the conditions described.

I will now briefly review the results of excision in arthritis deformans. Naturally I have only collected at random a number of cases, and undoubtedly I could prolong this paper by adding many more, but I think those here cited will suffice and allow me to deduce some conclusions. Aside from the two cases which resulted in death, I find that a rapid recurrence of the symptoms after excision occurred in one case; in five cases there was considerable improvement, by which I mean a decrease in the pain and a fair ability to walk; in eight cases the pain disappeared completely and nearly normal function was restored. These cases occurred in the majority of instances in young patients who could trace the commencement of the process to a trauma. Among the cases which were improved, two cases were young and three were advanced in years; while among those who were not cured or relieved, all were old people where the etiology of the process was not clear. Giving the percentage of the results we find: 12.5 per cent. deaths, 6.25 per cent. recurrence, 31.25 per cent. considerable improvement, and 50 per cent. permanent cures.

According to the above-reported cases it would seem that a youthful age, a mono-articular localization, a traumatic origin, and a rapidly developing progress are the cases giving the best functional results after excision. The excision of the hip-joint is only indicated in the severe types of the process, where all medical measures fail. The general condition, the age of the patient, occupation, and social position must also be taken into consideration. In order to obtain a good functional result an attempt must be made to preserve the trochanter, while special care must be taken in the after-treatment. Generally speaking it may be said that the results so far obtained by excision of the hip-joint in cases of arthritis deformans are fair, and it seems desirable to continue this treatment in the future, applying it to those cases indicated above.

CONDITIONS MODIFYING OPERATIVE WORK *

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THERE is nothing within the domain of surgical practice which requires more mature thought than the conditions modifying operative work. Some of the foremost surgeons in this country, and for that matter in the world, have devoted years of study to these important subjects, for it is a sad ending to a successful operation to lose the patient as a result of some complication which the operation was not intended to relieve.

The essential pathological condition for the relief of which the patient consults the surgeon is by no means the only thing to be considered in those seeking operative work, for in many instances coexisting with the conditions which warrant operative intervention there may be found serious affections that should influence, modify, or perhaps entirely control, the decision as to immediate or subsequent operation.

Surgical text-books, which are generally taken as a guide, are markedly deficient along the lines indicated, in fact the surgeon with limited experience is left almost entirely upon his own resources in arriving at a conclusion, or, to say the least, he is very much handicapped in deciding what method of procedure to advise. While at this time I deem it distinctly inadvisable, if not quite impossible, to lay down any definite and fixed rules to be followed, I desire to mention some of the conditions which are well known to have a direct bearing upon the questions under discussion.

Heart Disease.—One of the first questions asked the surgeon by a patient when surgical operation is suggested is, "Do you think my heart will stand the anæsthetic?" This matter has been so

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well grounded in the mind of the laity that it is paramount above all others, and we as physicians have been taught from time immemorial to dread the giving of anæsthetics to this class of patients as a whole. It has been my experience, and I believe statistics generally will bear out the statement, that ordinarily those patients the subjects of heart disease can be given anæsthetics with as much confidence as to safety as any other class, and particularly have the dangers incident to the giving of any kind of anæsthetic been very much overrated in those possessing valvular heart murmurs. Later investigations have proven that it is rare indeed for such patients to die from the anæsthetic; on the contrary, it is the robust, healthy individual, seemingly with no cardiac symptoms, who succumbs to a few whiffs of chloroform or ether. I have never seen in my own practice, nor can I recall in the experience of any of my colleagues, a single instance where, even in a patient having a valvular heart lesion which could be clearly detected, in which the anæsthetist greatly dreaded the administration of the anæsthetic, there was any trouble resulting therefrom.

It may be said in broad terms that all valvular cardiac lesions (except aortic regurgitation) that have been compensated for, occurring in patients under the age of forty years, do not contraindicate operative work. The most common lesion of all is the one heard over the apex, with the first sound of the heart, transmitted under the left arm to the scapula (mitral regurgitation); but the patient's general condition being good, such a lesion need cause no alarm, and the same is true of mitral stenosis.

Aortic regurgitation is far more serious, but when occurring in young subjects can be regarded nearly as safe as mitral lesions if proper care is exercised; but when existing in elderly patients, particularly those presenting sclerosis of the peripheral vessels, one should consider well before advising them to undergo any operation, and I may say that as a rule such patients should only be subjected to surgical intervention in emergencies and for life-saving measures.

Other cardiac valvular lesions occur with such infrequency that no fixed rule can be laid down, but any lesion, even though the heart is compensating for it, in patients over forty should be regarded as serious, for in most instances we are not confronted

with simple valve lesions, or trouble in the heart muscle, but by a complication of conditions.

Patients suffering from lesions of the mitral valve with moderate myocarditis take anæsthetics well, other things being equal, while aortic lesions with advanced myocarditis should be looked upon seriously. The surgeon should always withhold his opinion until the kidneys have been carefully examined and the blood pressure taken, for in the first instance a patient with marked lesions that can be heard easily with little or no kidney complications may be a good risk; and even in more advanced kidney complications, if it can be shown that the cardiac action and the volume of the pulse at the wrist are in direct relation to each other, one is safe in saying that the patient has sufficient cardiac force to withstand the extra strain incident to an operation of ordinary severity. If the heart's action is tumultuous and the pulse weak at the wrist, then such a patient should be regarded as a bad risk and be operated upon as a life-saving measure only. The heart should be examined for regularity, since an irregular pulse is far more serious, even though it be strong, than a regular pulse that is weak.

In chronic diseases a pulse rate of more than 120 to the minute should contraindicate operative work, but in acute conditions where the operation is little more than opening an abscess, the patient may be a good risk with a pulse of more than 120. Patients with a normally slow pulse, say 40 to 50, if it is regular, constitute a good risk. All conditions that show cardiac incompetency should contraindicate surgical intervention. If operation has to be performed under such circumstances it should be limited to palliation, and never be done for chronic disease, unless we except uterine fibromata; here one is many times forced to operate to relieve or limit heart conditions, and a heart that would contraindicate operation for carcinoma would not contraindicate operation for fibroma. It should be remembered that operations in the upper abdomen entail greater risk and try the heart more seriously than those in the lower abdominal zone.

Kidney Lesions.—As Sheldon has well said, the significance of renal lesions depends on the degree and variety of the kidney changes, the existence of disease in other portions of the body, the severity of the operation contemplated, and the relation that exists between the disease that requires the operation and the nephritis.

Patients the subjects of acute Bright's disease seldom reach the operating table; they either die or the affection becomes chronic before the surgeon sees them. It is not uncommon, however, for patients with suppurative renal disease to come for operation. Such patients should not be given a general anæsthetic if it can possibly be avoided, and the operation should be made as short as practicable, thus obviating to some extent hemorrhage and shock. Where surgery is not undertaken for relief of some condition that acts as a cause of the kidney lesion, you will materially increase the patient's chance of recovery by following the rule mentioned. But where operation is performed for relief of a tumor, adhesions, etc., which cause or aggravate the kidney lesion, of course surgery is always imperatively indicated and sufficient time should be taken therein to insure adequate relief.

The decision as to operative work is often very hard to reach in border line cases, *e.g.*, those showing a small amount of albumin with some casts in the urine. The albumin in many instances will entirely disappear if the patient is kept quiet in the infirmary and proper diet given. Hyaline and granular casts may almost or entirely disappear in a short time under proper care, but even if they do not and the patient's heart and vascular system have not undergone too great changes, operation may be undertaken with comparative safety. When the pulse shows high tension, however, and heart changes have taken place, even though there be no albumin present in the urine, the patient should be looked upon as a bad surgical risk, and if operation is performed at all it should only be undertaken after the most careful and repeated analyses of the urine have been made.

To sum up, my experience is in thorough accord with the views of the French Urological Society, *i.e.*, that the quantity of urine passed and the amount of urea contained in the twenty-four hours' urine should be the guide; that a small percentage of urea which cannot be increased makes the case extreme in character; that the majority of such patients will die of uræmic coma within seventy-two hours after operation.

Pyuria.—Pus in the urine may be of variable significance. It may contraindicate operative intervention, yet, on the other hand, may not influence it in the least. It may indicate at least some

form of surgical operation; it all depends upon where the pus originates along the urinary tract.

Glycosuria.—If transient, the presence of sugar in the urine does not mean very much. If with proper diet and rest it can be shown to be only transient, operation may as a rule be undertaken without anxiety. Recent observations have proven that the amount of sugar found in the urine should not influence the surgeon to the extent that was formerly customary in deciding whether or not to operate.

Other things have been shown to be far more dangerous than the presence of sugar in the urine, *e.g.*, the so-called acetone bodies (acetone, diacetic acid, and beta-oxybutyric acid)—these are responsible for the development of post-operative coma which is always to be feared. The oxybutyric acid is the most dangerous of all. It has been said by Kelly that 0.02 Gm. in 50 c.c. of urine will induce symptoms. Ruff has made the statement that coma will more than likely appear if the daily excretion of ammonia reaches two grammes. The condition known as "ephemeral glycosuria," where as much as one per cent. of sugar is found present in the urine of patients who have suffered a fracture or had strangulated hernia, may be regarded as transient and need not alarm the surgeon.

A review of the foregoing facts, studied in connection with the number of cases collected by Noble, Phillips and others, will prove to the mind of the most skeptical that diabetics are not such dangerous subjects for surgical operation as we were at one time taught. The statistics at hand are based largely upon the experience of surgeons dealing with suppurative conditions, and not aseptic wounds, in these cases. I am perfectly willing to admit, however, that in this class of cases the vitality is low and unquestionably they should not be operated upon except for the relief of accidents or as life-saving measures. Where operation under such circumstances must necessarily be undertaken not over twenty-five per cent. of cases should prove fatal if properly handled. Diabetics who have more than two per cent. of sugar in urine that is excreted to the amount of three pints in the twenty-four hours should not be operated upon. Where there is less than this amount the patient may be subjected to surgery if the operation promises complete relief and the condition for which it is undertaken is of such character as to threaten life.

Shock.—The condition of shock and its relation to surgical procedures applies almost exclusively to the treatment of accidents and injuries. No surgeon should be guilty of doing more for a patient in profound shock than to stop the bleeding. In former years before shock was so well understood many patients no doubt lost their lives through the kindness of the surgeon who in trying to remove a mangled limb so increased the shock already present that recovery became an impossibility.

The fact should always be borne in mind that a limb is not going to "rot off" in a few hours. When this is remembered many patients that were formerly operated upon at once will be put to bed, and morphine, saline solution, adrenalin, with external heat, will be used until such time as the patient rallies, when operation may be safely undertaken. If for any reason the surgeon decides to operate at once it should be under a local anæsthetic if possible.

Hemorrhage.—The question as to operating upon patients who, as the result of injuries, have lost and are still losing large amounts of blood, can be answered in a few words. Hemorrhage is always a positive indication for operative intervention. Where the bleeding is from such a source that it cannot be controlled by constriction or compression, one is forced to resort to such measures as will enable him to reach the bleeding vessels. I wish to state most positively that the indications for surgery are limited to this, and while there may be more work that needs to be done, it should not be included in the primary treatment. After the bleeding has been controlled such measures as are known to sustain the patient should be utilized, viz., stimulation, transfusion, etc.,—but these procedures are harmful if instituted before the bleeding vessels have been controlled.

Operation for pathological conditions which are producing hemorrhage may be demanded at a time when the patient is in poor condition to withstand it. Such work should be deferred as long as consistent with safety to the patient, not allowing the lesion to progress, however, far enough to cause second hemorrhage if it can be avoided.

Anæmia.—It is often a very difficult matter to determine the exact bearing that anæmia has on each individual case. A slight anæmia in one instance may contraindicate any operation, while a

pronounced anæmia in another may not weigh so heavily. If the anæmia is acute and of short duration, even though it be severe, it need not interfere as a rule with the surgeon in his work; on the other hand, if the anæmia is of long standing it should demand his foremost thoughts.

The teaching of Mikulicz, in my judgment, has not been improved upon, and I shall quote him freely. Operation as a life-saving measure may have to be performed with the blood in almost any condition, but operations of election on patients whose per cent. of hæmoglobin falls below fifty should be considered seriously before surgery is undertaken. If as low as thirty per cent., no operation should be performed until the patient has had such treatment as will raise it up to or above fifty per cent. If this cannot be effected, operation should not be undertaken.

The Nervous System.—Conditions of the nervous system seldom play any part in the question of deciding for or against operations made necessary by accidents or acute affections, but in chronic diseases I am fully convinced that the majority of surgeons do not give this subject the attention it justly demands. While it is true that the mind does not altogether influence the healing of wounds, it is equally true that it does have some effect. Two classes of cases illustrate this conclusively: First, it is a well known fact that wounded soldiers belonging to the victorious army do better than those of the opposing side. This is explained by the condition existing in the second class, known as the melancholic, who have fixed in their minds in the very beginning that they are not going to recover, hence no effort is made on their part to aid the surgeon. It must also be remembered that one-half per cent. of the patients who undergo gynæcological operations develop insanity, either temporary or permanent.

Patients who state that they have trouble in sleeping should be looked upon with suspicion, since many of them are the so-called "night drinkers," but when asked about this they deny it altogether or say they drink only at times. Closer investigation, however, will usually reveal the fact that they have all the vascular changes commonly seen in such cases, and many will develop delirium tremens after operation.

In regard to females the subjects of hysteria: There was a

time when the genital tract was looked upon as the primary causative factor in a large percentage of these cases, and there can be no reasonable doubt but in some of them the cause may be easily found in that region. My position concerning cases of this nature can be expressed in a few words, viz., nervous individuals of this character, or those who have gone further, even to the point of insanity, are entitled to just what sane people are entitled to, nothing more, nothing less! If there is a pathological condition existing that is known to be the source of irritation, or giving the patient more or less pain, or likely to undergo degenerative changes and become malignant, it should of course be promptly removed; but the removal of healthy Fallopian tubes, ovaries, and uteri, in the hope of relieving or curing such conditions as hysteria or beginning insanity, should be heartily condemned.

As was so well expressed by the late Doctor Henrotin, "No one can tell what a nervous woman is going to do." While it is true such patients may be benefited for a considerable length of time by surgery, many of them will lapse back into the old condition, or even worse if such is possible, within a few months after the operation. This temporary relief is accounted for by the shock of the operation and the preparation necessary therefor, which causes (as the Mayos have said) an equal distribution of the secretions of the ductless glands, or, in other words, as they have expressed it, an "evening up" of all the glandular secretions of the body, which makes the patient feel better for the time being; but this is only temporary and should not be considered an indication for operative work.

Patients whose family history suggests mental infirmities bordering on insanity as a rule should not be subjected to operation. Even the taking of an anæsthetic has been known to be followed by insanity in such cases.

Bleeders.—I dare say few surgeons take the trouble to investigate whether or not their patients are bleeders before operative measures are undertaken. It is true the condition known as hæmophilia is rare, but it is serious when present. My experience in this class of cases has been limited to two, and I hope I shall never encounter another. One was an abdominal section, the patient dying after the abdomen had been opened the fourth time in an

attempt to stop the bleeding. The second was a child three years old who had a hæmatoma over the left eye. I succeeded in controlling the hemorrhage in this case after four days of close watching and careful nursing, the patient being all the time nearly exsanguinated.

I fully agree with those who have studied this question closely, that hæmophiliacs should be operated upon only in emergencies, that operations of election should never be thought of, since the most trivial surgical measure may be followed by fatal hemorrhage. Stucky has reported a death from tonsillectomy in a bleeder, and others have been recorded as following the removal of adenoids. I believe we should always look for this condition before advising patients to undergo any kind of operative work. If we can find that they have at any time had trouble in controlling hemorrhage from a accidental wound they may have received, the administration of calcium chloride as preparatory treatment, where operations have to be undertaken, will in my opinion give some protection against the complications which may be expected to ensue. My advice is to let such patients alone, doing operative work only when imperative, and as a *dernier ressort*. Where surgery must be undertaken in this class of cases, women stand it better than men. This condition should always be looked for in the negro race.

Cachexia.—Malignant disease that has advanced to the stage of cachexia usually contraindicates operative intervention. Little or nothing can be expected from surgery so far as a cure is concerned. There are certain conditions, however, that arise during the progress of malignant disease that to my mind are not entirely dependent upon the extent of the growth, and which call for operative intervention. I refer to superficial ulcerations, the highest type of which is found in a cancerous breast that has become infected and is breaking down. Here we have a dirty, foul-smelling, ulcerated mass which is almost unbearable not only to the patient but to those in attendance. Even though such patients may be markedly cachectic and far beyond the period where a cure may be effected, yet removal of this foul mass is indicated for the reason that by eliminating the infected area you reduce the source of fever and also the depot of infection which in great measure causes the cachexia; and last but not least, the large ulcerated area is converted into a clean skin-covered scar (or wound that is clean), and the odor is entirely eliminated.

Again, malignant growths may be so situated as to produce pain of sufficient severity to demand their removal, they may be so located as to act mechanically and threaten life. Examples of this are seen in carcinoma of the bowel where intestinal obstruction is threatened, involvement of the urinary tract causing retention, and involvement of the larynx producing asphyxia. Such patients should be subjected to palliative surgery regardless of their general condition.

Pregnancy.—Pregnant women as a rule withstand surgical operations fairly well. It has been my fortune to operate upon several such patients (two were myomectomies) without their even having a miscarriage. Still I believe that ordinarily pregnant women, unless conditions exist which threaten to terminate the pregnancy, or to prove serious to the mother, should be allowed to continue until after confinement. Pregnant women who are the subjects of malignancy in its early stages should of course be operated upon at once if the child is under the age of viability, the mother in such cases being the one to whom all our attention should be directed. However, later on in the malignancy where we cannot hope to afford the mother a cure, operation being merely a palliative measure, then the child should receive the greater consideration, only such measures being instituted as will not threaten its life.

Tumors involving the lower genital tract which preclude the possibility of delivery are not in my opinion reasons for operative intervention during pregnancy, for with the present perfection of asepsis and our knowledge of dealing with intra-abdominal conditions, Cæsarean section can be performed with such low mortality to both mother and child that it should always be advised in preference to early measures that must necessarily destroy the life of the child even though they hold out greater hope to the mother.

Operations on the Fallopian tubes and the ovaries seldom have to be done during pregnancy, for the reason that tumors springing from these structures are usually high and do not interfere with delivery; but should they give serious trouble, as in twisted pedicle of an ovarian cyst, or should the abdomen have to be opened for other pathological conditions, there is no reason why we should not remove them, as the pregnant uterus lends itself kindly to gentle handling, and if not too greatly disturbed, uterine contractions will not take place.

Operations on the female breast during pregnancy can be performed without subjecting the woman to any great risk, unless such operative procedures are prolonged or the work is done immediately after confinement. Where possible it is better that the breast be left alone after delivery until the secretions can be dried up.

Age.—It is well known that children and very old people withstand surgery badly, and that they bear the loss of blood poorly. The child particularly reacts unfavorably to operation or injury of any kind, for the reason that the central nervous system is but immaturely developed and not in condition to withstand the shock sustained.

Little children are good subjects for general anæsthesia, and that is about the only thing that can be said in their favor in an operative way. This is explained by the fact that the central nervous system is well supplied with blood in early life. While these facts are conceded, yet the young are not good surgical risks. Operations on children under the age of three years are not to be undertaken except for harelip or cleft palate, which all surgeons agree should be corrected in early life. In my opinion hernias should not be operated upon until the child has reached the age of four or five years, and in the meantime the surgeon can determine upon what truss treatment he will employ and the benefit, if any, to be derived therefrom. This question has been studied very closely by Coley, and the foregoing opinion coincides with his reports in this connection.

The aged withstand operative work poorly, for the reason that they bear about the same relation to surgery as does the child. Degeneration is far in excess of regeneration, and you will find that old people are hard to revive after anæsthetics, there is much depression following operations, and the mortality is necessarily high. Again, changes have taken place in the blood-vessels and internal organs, particularly the kidneys and liver, and this is especially important to the surgeon, for though the patient survive the immediate effects of the operation serious complications may arise which the anæsthetic has induced. Local anæsthetics have to a great extent eliminated many of these dangers.

Obesity.—Fat people are bad risks for long and serious surgical operations. As a rule they take the anæsthetic badly, have

low resisting power, and as a result react slowly. The presence of fat in the wound renders the occurrence of infection more probable, and lastly, post-operative pneumonia is most commonly observed in this class of patients. In later life such patients possess hearts with little reserve force. All patients of this class should have special care and the heart muscles be carefully looked after before operation is undertaken.

Condition of the Lymphatics.—While little is definitely understood at the present time as regards the lymphatic system and the part it plays in connection with surgical operations, yet enough is known to lead one to believe that every patient should be examined to determine to what extent, if any, the thymus gland is abnormal; whether or not the patient, if a child, has ever had attacks of dyspnœa; or in the old, attacks of syncope, etc. This class of patients will be found to have a very low resisting power, they withstand injuries badly, and are prone to suffer from shock following anæsthesia.

Tuberculosis.—Tuberculous patients usually withstand surgery well, and especially is this true if the operation is directed toward relief of the tuberculous infection. If operation is performed for some condition independent of the tuberculous infection, the results will depend on the extent of the tuberculous involvement. Patients far enough advanced in tuberculosis to have marked changes in their general condition should as a rule be left alone.

Syphilis.—Patients the subjects of syphilis withstand surgery and anæsthetics without any special difficulty. Patients suffering with the disease in acute form should only be subjected to operation as a life-saving measure, all other surgery being deferred until the disease is under control.

Gynæcology and Obstetrics

A CASE OF ACUTE YELLOW ATROPHY OF THE LIVER AND PERNICIOUS VOMITING OF PREGNANCY

BY ROBERT JARDINE, M.D.

Professor of Midwifery at St. Mungo's College; Physician to the Glasgow
Maternity and Women's Hospital, etc.

MRS. W., multipara, aged 30, was admitted to the Glasgow Maternity Hospital on July 7, 1907, suffering from persistent vomiting and jaundice. The patient thought that she was about three months pregnant, but she was not sure of her dates. In all her previous pregnancies she had been much troubled with sickness during the first three months of each, but she had gone to full time. On each occasion the sickness had come on very early and had lasted until well on in the third month. During the third pregnancy there had been slight jaundice, but it had soon passed off. The present attack of vomiting had commenced fully two months ago; at first it was slight and intermittent, but latterly very severe, and for some time the patient had been unable to retain any food. Very marked jaundice had made its appearance a week before admission. All the usual remedies had been tried without any benefit to the patient.

On admission there was deep jaundice present, the skin was harsh and dry, and the tongue dry and caked. The pulse was small and rapid, 116, and the temperature 97° F. The patient had a toxic appearance. There was no diminution of the liver dulness, but by percussion the spleen seemed slightly enlarged. The uterus had not risen out of the pelvis, but it was not displaced. There was no great wasting. The urine was scanty, deeply stained with bile, and contained a good deal of albumin. During the first twelve hours only 14 ounces were passed.

Rectal feeding was commenced at once. Sixteen ounces of the urine were sent to Dr. Cathcart in the University of Glasgow for an estimation of the total nitrogen, urea, and ammonia.

The following is his report:

Urine amount.	Total nitrogen.	Urea nitrogen.	Ammonia nitrogen.	Urea N. in % of total N.	Ammonia N. in % of total N.
16 oz.	7.63 Gm.	5.43 Gm.	0.213 Gm.	71.1 %	2.8 %
Urea = 11.64 Gm. Ammonia = 0.258 Gm.					

"As the urine contains albumin, although not in very large amounts, the low percentage of urea nitrogen may be more or less disregarded, more especially as the ammonia output is low. The normal percentage output of urea nitrogen on an ordinary mixed diet lies as a rule somewhere between 86 and 90 per cent.

"The low output of ammonia, 0.213 Gm. and 2.8 per cent., rather points to the fact that there is no very abnormal acidosis, i.e., that there is no great output of acids, with which the ammonia might combine, from the body."

Two days after admission the retching and vomiting had lessened very markedly. Sips of water only were given by the mouth. The tongue was still very furred.

July 10.—There has been gradual improvement, the vomiting has ceased, and the jaundice lessened. The patient looks better, but the pulse is still rapid and the temperature remains slightly subnormal. Two days ago two drachms of milk and two drachms of barley water were consumed by the mouth every two hours, and the patient has retained it. Bismuth and bicarbonate of soda, 10 gr. each, were given every six hours for heartburn.

July 12.—The jaundice is lessening, but the patient is very weak, and still has a toxic appearance, but there is no vomiting. A little champagne was given, and more food by the mouth.

July 14.—The patient has been taking well mashed chicken and fish without any sensation of nausea. She has also had sips of champagne every two hours. Last night her temperature was normal, but this morning it had risen to 101.2° F. and by the evening to 103.2° F. In the evening the pulse was 160, and the patient was excited. Cold sponging was tried.

July 16.—The temperature has fallen to 101.2° F., but the toxic appearance of the patient has increased. There is no sickness, and no increase in the jaundice. I decided to empty the uterus, and did so without any difficulty, using Hegar's dilators. A saline infusion of two pints was given under the breast during the operation.

The patient remained very quiet and almost comatose after the operation and in four hours the temperature had risen to 103.2°

F. A small quantity of dark porter-like fluid was vomited. The temperature gradually rose until it reached 107° F. about fifteen hours after the operation. The patient died three hours later. The coma deepened towards the end, but there were no convulsions.

The post-mortem examination was performed by Dr. Hugh Galt, who reported as follows:

There was a thick coating of highly bile-stained subcutaneous fat all over the body.

The external appearance of the lungs was normal except for adhesions over the posterior surface of the left one. On section they were typically febrile in character with marked œdema and some congestion present.

The heart was soft and flabby and very fatty in appearance.

Abdominal Cavity.—On separating the organs at the upper part the liver and spleen were found to be firmly adherent to the diaphragm and the stomach. The mucous membrane of the stomach was somewhat soft and greenish in color, but there were no signs of antecedent disease.

Liver.—The upper and posterior surfaces were firmly adherent to the diaphragm. The color was markedly olive green, and the organ was soft and flabby. It was smaller than normal, but this was not markedly the case. [Unfortunately the weight has not been entered in the report.] The gall-bladder was full of black bile, exactly like thin tar.

Kidneys.—Normal in appearance. The capsules stripped easily. The cortex seemed slightly granular.

Spleen.—Was slightly enlarged and congested and was very adherent to the diaphragm.

Uterus and appendages were normal. The uterine cavity was quite clear except for the presence of a small clot.

The liver, spleen, and kidneys were examined microscopically in the Pathology Department of the Western Infirmary by Dr. Logan Taylor, who has kindly furnished me with the following report:

CASE OF MRS. W., MATERNITY HOSPITAL

Portions of the liver, spleen, and kidneys were submitted to me for microscopical examination.

Examination of sections of the liver (stained with hæmalum and eosin) shows the pathological lesion to be that of acute yellow atrophy. On examination with the low power, one is struck particularly by the total absence of any nuclear staining, the whole of the cells taking on a uniform faint red color from the eosin. Another noticeable feature is the entire want of lobulation, though remains of what must have been interlobular vessels can be seen here and there. There is a complete necrosis of all the hepatic cells. Some are swollen and granular and do not contain any fat drops, the nuclei, though not really stained can be seen faintly. Other cells contain fat drops of various sizes, and in some of the cells the fat drops have run together, so that the

cell is represented by a large globule of fat enclosed in a slender envelope. Many of the cells again are so much broken up that their shapes cannot be made out, consequently a group of such cells is represented merely by a large number of granules. Some of the cells look just like shadows of their former selves. Many of the cells again contain fine yellowish pigment granules. In the areas where the cells are most broken up the pigment is most plentiful, thus giving a distinct yellow color to that part. Where interlobular vessels are present they have also become quite necrosed. The condition appears to be an extreme fatty degeneration of the liver with complete necrosis of everything.

The pathological lesion in the kidneys is somewhat similar to that met with in the liver. The changes in the kidneys are mostly confined to the cortical zone. Here, the epithelium of all the convoluted tubules and of the ascending loops of Henle has suffered most. The renal epithelium, just like the hepatic cells, has undergone complete necrosis. In most instances the cells are extremely swollen and granular, while the nuclei can be made out, though not taking on the nuclear stain. In some of the tubules the cells are very much broken up and have become desquamated. In the straight tubules of the medullary zone the proper nuclear staining of the renal epithelium is quite evident, though the cells in this area also are very granular. Here also hyaline and granular casts are plentiful.

There is nothing very striking in regard to the condition of the spleen. With the exception of a certain degree of venous congestion and the presence of a large quantity of yellow pigment granules throughout the meshes of the pulp, there is nothing worthy of note.

Acute yellow atrophy of the liver is a very rare complication of pregnancy, but a most fatal one. About sixty per cent. of the cases seem to occur in connection with pregnancy, usually in the latter half of gestation; but cases have been seen in the sixth and eighth weeks. The present case was in the third month.

There is a very close connection between this condition and that of toxæmic vomiting of pregnancy. The present case at first was supposed to be one of vomiting with some involvement of the liver. No diminution in the size of the liver could be made out. Undoubtedly the condition is a toxic one, but of the nature of the toxin and its origin we know nothing.

When the patient was admitted I was inclined to empty the uterus at once, but I waited for a report on the urine. According to Whitridge Williams, in cases of toxæmic vomiting and acute yellow atrophy the ammonia coefficient in the urine is greatly elevated. When Dr. Cathcart reported that the coefficient was low I decided to wait, and as the patient's condition had improved I was strengthened in that decision. The improvement was so marked

for a few days that it looked as if the patient were recovering. A rise of temperature in a case of pernicious vomiting is always a danger signal, and so it proved in this case.

I regret very much that only one examination of the urine was possible, as Dr. Cathcart was away from home. I am obliged to him, and also to Drs. Hugh Galt and Logan Taylor for the pathological reports.

INTESTINAL OBSTRUCTION DURING PREGNANCY AND THE POSTPARTUM

BY CHARLES GREENE CUMSTON, M.D.

of Boston, Mass.

INTESTINAL obstruction during pregnancy was formerly considered to be a very infrequent affection, but in 1901, Vergez reported twenty-five cases in his thesis, but of these three should be discountenanced because they were due to coprostasis without any mechanical obstruction and recovered by appropriate treatment. A year later Daniel collected thirty-nine cases and in Gaudry's thesis we find thirty-nine instances of intestinal obstruction during pregnancy. In 1904 Prioulat collected sixty-two instances, while since this I have been able to collect twenty-seven instances in literature, including one of my own, thus bringing the total to eighty-nine up to date. It is quite possible that other instances have been recorded, but time has not permitted me to make as careful a search as I should have wished.

In going over these cases I have found that the frequency of intestinal obstruction in pregnancy is greatest between the fourth and fifth month, then it diminishes and again increases during the eighth and ninth months. Now, these two maximum points of frequency, namely, the fifth and the ninth month of pregnancy, correspond to distinct stages in the evolution of pregnancy. In point of fact, during the first three months the pregnant uterus occupies the pelvic cavity and is only in relation with the lower end of the intestinal tract and this is why I have only been able to find four instances of obstruction at this period. On the contrary, in cases of extra-uterine pregnancy the fetal cyst, which in the third and fourth months reaches the size of a closed fist or even larger becomes wedged in between the rectum and uterus, compresses the gut and thus gives rise to intestinal obstruction.

Pinard does not consider that intestinal obstruction is a complication of uterine pregnancy, but one of the extra-uterine type.

At the commencement of the fourth month the uterus *in toto*

comes out of the superior strait and then soon occupies the greater portion of the abdominal cavity. At this time its relation to the other viscera alters, and it is readily understood that in this ascension it changes the position of the intestinal coils, and exercises traction on any existing adhesions, so that the symptoms of occlusion are produced,—which I shall describe more in detail when speaking of the pathogenesis. And lastly, during the last three months the dimensions of the uterus still increase, particularly at its lower segment, which, in itself, becomes lowered, so that the organ almost completely fills the abdominal and pelvic cavities. If, on account of a peritonitis, the intestine has become bound down, it will be pulled upon and cannot escape the causes of compression due to the presence of adhesions, so that coprostasis or even complete obstruction may result. During the postpartum the considerable and relatively sudden displacement undergone by the intestine after emptying of the uterus has occurred, explains the greater frequency of symptoms of obstruction at this time. The etiological factor of the strangulation is present during pregnancy, but, at this time, the greatly enlarged uterus pushes the intestine more or less away from the small pelvis and, at the same time, the adhesions go likewise. Independently of these physiological causes, others have been recorded, such as great fatigue preceding the occlusion, an effort or a very difficult labor, when this complication occurs during the postpartum—these are perhaps occasionally factors in the production of occlusion. Out of 42 cases, 12 were primiparæ, 8 had given birth to 2 children, while the remaining 22 were multiparous. As to the age of the patients I find that out of 44 cases it occurred more frequently between the ages of 30 and 40 years.

Various types of intestinal obstruction may arise during pregnancy and the postpartum, such as invagination, volvulus, torsion and, above all, strangulation. Out of 46 cases, where the lesions were discovered, 28 were instances of strangulation—in other words, a proportion of 60 per cent.; the occlusion resulted 9 times from compression, and in the 9 other cases the obstruction was due to volvulus, torsion, or invagination. Strangulation in the majority of cases was produced by an old peritoneal adhesion. These were usually found in the right iliac fossa, probably dependent on the appendix, which is such a frequent cause of peritoneal inflamma-

tion. In one case the appendix itself was the cause of the occlusion. The patient was five months pregnant, when, suddenly, all the symptoms of an intestinal occlusion appeared, accompanied by a sharp pain at McBurney's point, resulting in the diagnosis of appendicitis. Autopsy showed that the peritoneum and intestine were normal, but the cæcum and intestine were distended, while the appendix extended downwards and inwards and being adherent to the gut, was the causative factor of the occlusion. It was removed and a histological examination showed that it was healthy.

Constrictive adhesions may be divided into parieto-intestinal, utero-intestinal, adnexa-intestinal, omental, or interintestinal. Their size, strength, and consistency vary,—sometimes they are extremely hard and fibrous, while at others, it is easy to break them.

The parieto-intestinal bands usually follow a former operation. In one case the operation had been done six and a half months before and had given rise to two bands originating from the mesentery in the neighborhood of the cæcum and thus compressed the intestine. They subsequently broke. In another case eight years after an operation for tubal pregnancy, a strong band the size of a quill developed and extended from the gangrenous loop of gut to the cicatrix in the abdominal wall. At autopsy another very firm band was found extending from the left uterine cornu to the corresponding iliac fossa and appeared to have been the principal cause of the obstruction. In a similar case, an operation was done for tubal pregnancy on a patient who, eighteen months later, presented all the symptoms of obstruction. However, in this case, the occlusion was not due to a parieto-intestinal band, which was present, but to another more deeply seated adhesion. In another case, adhesions were found between the sigmoid flexure and the left adnexa, while in still another the omentum adhered on the right to the anterior surface of the uterus and also from the fundus a band had developed and was united to the lower portion of the omentum forming a narrow ring a little below the promontory, and through this ring a loop of small intestine had passed. The presence of adhesions uniting loops of intestine has been the cause of the occlusion in several cases.

Another cause of occlusion results from the entrance of the intestine into an accidental opening, the result of a tear in the

mesentery, omentum, broad ligament, or diaphragm. In one reported case a loop of intestine passed through an opening in the broad ligament which was rendered tense by the pregnant uterus. In another case the small intestine became strangulated in an opening in its own mesentery and became twisted to the extent of 180°. In another instance where autopsy was performed, the omentum and left angle of the colon had entered the pleural cavity by passing through the oesophageal opening in the diaphragm which was enlarged, and compressed the base of the left lung.

Occasionally we find as a cause of occlusion, torsion of the pedicle of an ovarian cyst, whose walls have frequently been covered with adhesions involving loops of intestine. In one case there were two adhesions extending from the wall of a hydatid cyst to the peritoneum just within the cæcum. The cæcum becoming distended pushed against this adhesion and a large strip of necrosis was present on the intestinal walls at the point of compression. In another case the occlusion resulted from an adhesion arising from the upper portion of the omentum on its under aspect and extending towards the right, compressing a fluctuating tumor, winding round the pedicle of the latter four times; this tumor also presented adhesions with the appendix, cæcum and ileum.

In some cases strangulation by compression from a large area is observed during pregnancy. In several cases an ovarian tumor was found compressing a mass of intestine, while in others the compression resulted from a posterior parametritis. The following cases, however, are rather special to pregnancy. In one case a uterine fibroid compressed the sigmoid flexure, in another the rectum; in still another instance a seven months pregnant uterus, retroverted and incarcerated in the pelvic excavation, compressed the intestine. At the third or fourth month, at the time when the uterus becomes too large to remain in the small pelvis, it may fall backwards instead of rising out of the small pelvis and by compressing the gut in this manner, gives rise to symptoms of occlusion.

Jacobs who has a number of times performed hysteropexy for retroversion, had two cases of intestinal occlusion from the resulting adhesions. This condition of affairs has also been reported by a number of operators.

In cases of narrow pelvis, the pregnant uterus may produce a

compression on the sigmoid flexure. This occurred after a Cæsarean operation on a rachitic female operated on by Pollosson. In a patient eight months pregnant, Thiery was unable to introduce his hand between the promontory and the uterus after the abdomen was opened; and lastly a very interesting case is the one reported by McArdle, in which rupture of a tubal pregnancy in a woman four months pregnant, produced symptoms of occlusion. There are other cases (where the treatment employed was followed by a cure) which led certain writers to believe that compression of a normal pregnant uterus on the intestine might give rise to occlusion. In Tournay's case symptoms of obstruction appeared three days before labor, the uterus being tipped towards the left. The patient was placed in a genupectoral position; this was followed by a complete evacuation of the bowels and all symptoms subsided. In a case recorded by Prioulat, the symptoms of obstruction occurred forty-eight hours after the labor, the uterus being directed towards the left and backwards; an enema administered with an œsophageal sound resulted in an evacuation and the patient recovered, although, at the time, she presented very serious general symptoms. In another case, which is quite similar, laparotomy was done on a patient seven months pregnant, who presented all the symptoms of an appendicitis. At the operation the peritoneum and appendix were healthy, but the intestine was extremely distended. On the following day, a premature labor was induced and afterwards a simple purgative completely emptied the gut, resulting in a cure. It is consequently probable, that, in the above mentioned cases, the pregnant uterus compressed the intestine and gave rise to the symptoms of occlusion.

Complicating a bad position of the uterus, I have found three instances of invagination. The first one was recorded by Coppert, with expulsion of a segment of the intestine, which was recognized at autopsy by the presence of a circular cicatrix 15 cm. from the ileocæcal valve with stricture of the intestine. In Porak's case an invagination of the small intestines to the extent of 10 cm. was found. The gut was gangrenous. In Ayer's case, the patient expelled two feet of small intestine and presented symptoms of sub-acute occlusion.

I find reported seven instances of volvulus and torsion. In

Morestin's case the loop of small intestine was twisted to the extent of 180° , while in Gottschied's case, there was a double torsion of the middle part of the transverse colon. A volvulus of the sigmoid flexure during pregnancy has been observed four times and, in one of these, there was a torsion of the sigmoid flexure on its axis with a torsion of the uterus. Kinks in the intestine have been found, produced by adhesions, while I am only aware of one instance of stricture of the gut, this being due to a malignant growth in the rectum.

To sum up, it may be said that, although pregnancy has often been incriminated in the genesis of intestinal occlusion, there are a certain number of cases where it does not seem to have had any influence on the occurrence of the obstruction.

Our knowledge of the etiology and pathology will allow one to make three groups of this affection from the pathogenic view point, viz: (1) intestinal obstruction produced by the pregnancy; (2) occlusions influenced by the pregnancy, which may be termed paragravidic; and, (3) occlusion quite independent of pregnancy, or extragravidic.

In the first group may be placed a certain number of instances. For example, in Tournay's case, the uterus lay to the left and to all appearances compressed the intestine, because the genupectoral position resulting in a change in the position of the uterus, had the effect of completely emptying the gut. In Pollosson's case, after a Cæsarean operation, the patient was taken with violent pain and all the symptoms of an intestinal occlusion. At autopsy the intestine was found distended above the superior strait, at which point the uterus compressed the sigmoid flexure, leaving the rectum empty. The reduction of a four months pregnant uterus in retroversion in another patient resulted in the exit of gas and fecal matter; the patient died of peritonitis and the presence of bacterium coli was demonstrated in the uterine cavity. The arrest of the fæces and the trauma resulting from the compression favored the development and migration of this microbe. In Treub's case one was dealing with a compression of the sigmoid flexure from a seven months pregnant uterus wedged in the small pelvis. In Bandéra's case autopsy showed a marked hyperæmia and distention of the entire intestine, the sigmoid flexure was lying against the cæcum

with which it had contracted adhesions, the six months pregnant uterus projected out of the abdominal cavity and its size appeared incompatible with that of the intestine. In LePage and Andérodias's cases operation confirmed the diagnosis of compression of the rectum by the pregnant uterus, because, as soon as miscarriage occurred, fetid gases and a large amount of feces were at once expelled. In the cases of Kebrer and Pollosson,—one being a rachitic subject, the other having osteomalacia,—Cæsarean operation was done at the end of pregnancy. In the former case death occurred three days later, and at autopsy fluid was found in the peritoneal cavity, the intestine was distended, the rectum was empty and compressed by the uterus which was the size of a child's head. In the other case it would appear that the occlusion was also due to the uterus, which was lying backwards and to the left, probably compressing the intestine. However, in Gottschalk's case, the mechanism appears quite different, because at autopsy the uterus which was markedly turned towards the right, and surrounded by the intestine was covered anteriorly by the right branch of the sigmoid flexure, which was enormously distended. The left adnexa, which were situated forwards nearly in the median line, presented traces of adhesions which had been ruptured as the uterus increased in size. According to Gottschalk, torsion of the uterus produces a torsion of the sigmoid flexure. And lastly, during operation, Karstrom was able to demonstrate a kink in the intestine around the pregnant uterus. In both these cases, the genesis of the occlusion resulted from the peculiar position of the uterus.

Paragavidic intestinal obstruction, particularly, comprises cases of internal strangulation, which, according to Demelin are more particularly met with postpartum, at which time the emptied uterus gives more space within the abdomen to the intestinal loops.

In the first group of cases, there is intestinal paresis, with coprostasis, as is frequently observed in pregnant women. Thus, in a number of instances reported, recurring constipation was observed, which could be relieved by medical means, but, after a time, became permanent. For that matter purgatives or enemata are ineffectual from the start. These cases of obstruction, due to coprostasis, are well demonstrated by the reports of Meyer, Albrecht and Sidney Jones, in which the serious symptoms of obstruction

disappeared by the use of purgatives, enemata, etc. The occlusion resulting from coprostasis may also be encountered during the postpartum.

In the second group of cases are included instances of bands or adhesion due to a former inflammatory process of the peritoneal serosa, or an operation on some abdominal viscus, usually the uterus, tubes, or ovaries. During pregnancy, by its increase in size, the uterus acts either by its volume, compressing the intestinal loops and pushing them into some abnormal orifice, or by causing the gut to become bent over a tense adhesion, whether it acts directly on this loop, or by the intermediation of another intestinal segment. Then, again, the peritoneal adhesion may be inserted on the uterus itself at one of its extremities, while the other is united to the omentum or large intestine and the uterus in rising causes this band to become tense and to bind down an intestinal loop.

Occasionally there are very complex lesions, such as rupture of the uterus, mesentery, or broad ligament, but it is particularly at the time of labor that adhesions starting from the uterus give rise to accidents of this kind and, under these circumstances, the pulling exercised by the intestine on the uterus may, perhaps, play a part in setting up uterine contractions. Occasionally it is after labor that occlusion takes place. When once delivery is accomplished a great change takes place in the intestinal mass, which occasionally returns to its former situation under conditions quite unfavorable for strangulation from a pre-existing adhesion. According to Demelin occlusion takes place by a mechanism similar to that giving rise to torsion of the pedicle of ovarian cysts after delivery and, in one case recorded by Bar, there was intestinal occlusion following a Cæsarean operation.

Extragravidic occlusion is a complication of pregnancy and in some cases reported at operation it was found that one was dealing with a torsion of the pedicle of an ovarian cyst, while in other instances a tumor which was thought to be a movable kidney, was reduced four times during pregnancy. At the operation a fluctuating ovarian growth, similar to a tubal pregnancy, was found, the pedicle of which was tightly bound by an adhesion that turned it on its axis four times. It is probable that each time the growth was reduced the tumor was pushed above the adhesion and afterwards

slipped behind it and finally became strangulated by it. In other cases the invagination found was probably related to the condition of pregnancy which favors enteroptosis, especially in a multiparous woman. Ayer questions whether or not in the case he reports the tuberculous intestinal ulcerations and the vomiting of pregnancy did not have some influence in the production of invagination. Vergez places two cases of volvulus in this group of cases, but their manner of formation was not demonstrated. Extra-uterine pregnancy as a cause of occlusion will be considered later on, and I would only here mention one case recorded by McArdle in which there was rupture of a tubal pregnancy, while at the same time there existed an intra-uterine pregnancy.

It seems to me hardly possible to describe any particular clinical types of intestinal occlusion during pregnancy, because, during the latter, as in the non-pregnant woman, the symptoms characterizing occlusion make themselves evident at the beginning, with a progress and an intensity so varying, that it is very difficult to assign to them any absolute characteristics. The commencement is occasionally slow, the patient merely complaining of indefinite pain, constipation of several days' duration and occasionally diarrhoea or nausea. In other cases the commencement is very sudden, with intense pain, vomiting rapidly becoming fecal; purgatives and enemata have no effect and finally general symptoms appear. Occasionally it is just these general symptoms which dominate the scene; the patient presents the characteristic peritoneal pinched expression, the pulse is small and rapid, the skin cold and covered with sweat, while the temperature remains either normal or falls to subnormal. The symptoms may in some instances remain obscure and have no relation to the seriousness of the affection, as in Ayer's case in which the obscurity of the symptoms rendered the diagnosis impossible and in which the elimination of two feet of intestine was only accompanied by a relatively slight local inflammation. During the eighth and ninth months, in cases where the symptoms suddenly appeared, one is led to believe that labor has commenced; but doubt in this respect is not of long duration. The accidents of occlusion may commence as soon as a normal labor has taken place, or some days after it, just as it may also take place after labors requiring operative interference. In a word, the commencement of intestinal occlusion is

quite as variable during pregnancy and the postpartum as it is where no pregnancy exists, and it may be sudden or slow in its appearance, with or without prodromes. The principal functional symptoms are constipation, pain, and vomiting.

Constipation is one of the first symptoms, but is not always the earliest in its appearance as some writers have upheld. In the cases that I have studied I find that constipation as the first symptom was present in 44 per cent. of the cases, while pain occurred in 50 per cent. of the cases. However, it may be said that constipation is one of the most constant symptoms we have, because it never is wanting when the occlusion is fully developed. It is rather difficult to say just what are the earliest symptoms, because they are not always recorded in the reports of cases. In a case recorded by Heath, constipation had been present for six days, and vomiting for three days, while the painful phenomena appeared on the ninth day. In Treub's case the patient had been constipated for five days and vomiting appeared on the fourth day. In Gottschalk's case the severe pains appeared six days after the commencement of the constipation. In other cases constipation had been present for one, two, and three weeks. Constipation is absolute when the occlusion is fully developed, although in two cases it would appear that this was not the case. What takes away from constipation a certain amount of its value as a symptom of the commencement of the occlusion, is, that in pregnancy it is very frequent and when a woman consults the physician for a constipation of a few days' duration, a diagnosis of coprostasis is usually made and purgatives are ordered. When no result is obtained from medical treatment, intestinal occlusion is usually suspected as soon as there is a complete arrest of gas and fecal matter.

There is also a symptom which, so to speak, is contradictory; I refer to diarrhoea and this has been met with in three cases. One might theoretically suppose that the intestine reacts by an exaggeration of its secretory and motor functions against the foreign body within its lumen. The increase in the secretion and movements of the intestine from irritation would probably indicate an incomplete occlusion.

Pain is met with as an early symptom in about 50 per cent. of these cases. In intensity it naturally varies, sometimes being

sharp and sudden in its appearance, while, in other instances, it is dull and only increased by abdominal palpation or percussion. It appears at the commencement of the process, then it diminishes for a certain time, only to recur again with greater intensity. Its location varies; it may be present over the point of the occlusion in the iliac fossa, at McBurney's point, or in the epigastrium, while, in other instances, it is present throughout the entire abdomen. I find a few cases where the pain was colicky in nature and accompanied by constant desire to go to stool; or, on the other hand, the patient was either nauseated or vomited. Enemata and purgatives, with irrigation of the stomach, may diminish the pain.

Vomiting is also one of the constant symptoms of intestinal occlusion, and I am only aware of one case where it is not mentioned in the report. I would point out, however, that in some few cases, nausea may alone be present. As an initial symptom it is found in about 34 per cent. of the cases, but nausea may be present either at the commencement, or when the occlusion has fully developed, or towards the end, and consequently, one should not place too much importance upon the time of its appearance and wait for fecal vomiting before operating. At first the matter vomited consists of food and then becomes mucous or bilious and finally fecal in a lapse of time varying from two to six days. Fecal vomiting is met with quite as often in occlusion of the small intestine as in that of the large. In three cases the vomiting occurred as an initial symptom without any prodrome after the patient had eaten a heavy meal, and consequently, the case was at first looked upon as one of indigestion.

As the general symptoms may be slow or rapid in their development, they contribute in occasionally giving a sudden and serious aspect to intestinal occlusion. Occasionally, they dominate the entire clinical scene and alone make evident the gravity of the affection by their presence. The pulse is small, rapid and compressible, while the skin is covered with a clammy perspiration; the voice is weak, the face pinched, and there is cyanosis of the lips. Temperature is either normal or sub-normal, unless some complication is present. Generally, no analysis of the urine has been made, but when this has been done, albumin was usually found. Sprigg encountered very short suppression of the urinary secretion which

he explains by a reflex nervous action. Ayer found indican in the urine in his case. Finally, the patient rapidly loses strength; hiccough when present should be considered as a rather serious symptom.

The local symptoms complete the clinical picture and from the first to the third months they often lead to a diagnosis of extra-uterine pregnancy, while from the third to the sixth months, they acquire a great value. By inspection one may discover either a generalized or limited distension of the abdomen and sometimes from this distension one may suspect that a pregnancy is more advanced than it really is. By palpation one may occasionally map out the loops of intestine and oftentimes a more or less hard mass may be found in the iliac fossa in the neighborhood of the uterus. By percussion tympanism may be found and sometimes dullness over the centre of the tumor. Combined rectal and vaginal examination has sometimes allowed one to detect a mass in one of the culs-de-sac.

The examination is often rendered extremely difficult on account of the extreme tension of the abdominal wall, and during the ninth month the examination would *a priori*, appear more difficult, but no conclusions in this respect can be deduced merely from reported cases. A diagnosis has been made from the patient's general condition, from palpation and from the nature of the tumefaction. The uterus has been difficult to detect, unless it has ascended high up into the abdominal cavity. During labor the symptoms of occlusion are hidden by those of the labor and only assume their value after the uterus is empty. In one case the pain due to the commencement of the occlusion began with the labor, the latter taking place naturally. On the third day the patient had nausea and vomiting, the abdomen was distended and the pain present on the left side was increased by palpation. There was dullness on percussion on the left, with a sensation of a deep seated tumefaction. In another case after labor a mass was found on the left of the umbilicus and above the uterus. In the postpartum, intestinal occlusion always presents its ordinary symptoms.

The complications that are observed are premature labor,—which I shall consider when speaking of the prognosis,—and peritonitis. The latter complication has occurred in certain cases fol-

lowing perforation of a gangrenous intestine. It has taken on a diffuse type with the aspect of a hyperacute peritonitis in one instance, while in other cases it has remained limited. And lastly, peritonitis has been known to occur without perforation of the gut, just as it has been observed when no pregnancy has been present. In one case, it appears to have arisen by way of the circulatory system and the septicæmia was generalized, while in another case, the patient had a miscarriage following which the uterine cavity became infected by the colon bacillus and adhesions resulted between the uterus and intestine. The symptoms of peritonitis during an intestinal occlusion are difficult to recognize, but the rapid pulse and rise in temperature have their importance from a diagnostic point of view.

The symptoms which allow one to make a positive diagnosis of intestinal occlusion during pregnancy are constipation, pain, vomiting and local signs to which general phenomena may or may not become added. The diagnosis has been made twenty-seven times out of fifty-eight cases, in other words, in 66 per cent., and out of the 19 where it was not made, a diagnosis of peritonitis from appendicitis was suspected, and once acute peritonitis with probable obstruction. In one case the symptoms of peritoneal infection hid the signs of the intestinal obstruction, and in two others the symptoms of the occlusion were attributed to uterine contractions; three times strangulated hernia was suspected. In one case a diagnosis of typhoid fever was made, while in six other cases no diagnosis was made whatever.

This enumeration, perhaps somewhat long, shows that the diagnosis of intestinal obstruction must be differentially made from that of several other affections, the principal of which are peritonitis, appendicitis, strangulated hernia and a ruptured extra-uterine pregnancy. Beside these, a woman may present during pregnancy, labor, or the postpartum, a series of symptoms which may put one off one's track in the diagnosis of the affection which we are considering.

In the first place we should consider pseudo-occlusion resulting from intestinal paralysis. Constipation, which is observed in women, even when not pregnant, is still more marked during gestation, and when it has been prolonged it may produce serious dis-

turbances, such as anorexia, pain, vomiting and a rise in temperature. Towards the end of pregnancy these same symptoms are met with, occasionally accompanied by diarrhoea with incomplete emptying of the lower bowel. The fetal head when engaged may, by compression, prevent the emptying of the gut, but, under the influence of appropriate treatment, this may be overcome. After labor, simple constipation may be present, accompanied by headache, a slight elevation in temperature and distention of the abdomen, which may occasionally lead one to suppose that there is an infection present. In these cases the physician is apt to suspect an infection of the genital apparatus, when in reality there is none; the lochia are normal, the uterus painless, and the intestinal apparatus is really the only thing at fault. Those affections having a uterine origin are certainly more frequent during the postpartum than those having an intestinal origin, and one must not make a diagnosis of occlusion until the case has been considered very carefully. Nevertheless, if this condition is infrequent, the obstetrician should be well aware of the fact that it can occur, because an active interference can alone save the patient.

Persistent vomiting of pregnancy may be a cause of diagnostic error, all the more so from the fact that it is frequently due to constipation, but I am aware of only one case where the vomiting due to intestinal obstruction was taken for the vomiting of pregnancy. The patient was four months pregnant and had suffered from constipation for six days, nausea then occurred, followed by vomiting, which was considered due to pregnancy. In practice, however, if this mistake should be made it will not be of long duration, because in occlusion the vomiting soon becomes fecal, is accompanied by pain, the constipation is intractable to all treatment, and soon severe general symptoms make their appearance. One may also meet with abdominal distention in pregnant women, which will give rise to the impression that pregnancy is further advanced than it is.

At the time of labor, whether this occurs at full term or not, the diagnosis of intestinal obstruction will be always more or less uncertain. One cannot at this time judge according to the pain and vomiting, which are always variable and may lose their diagnostic value, so that at the most a sudden severe and continuous pain with a slow labor may possibly cause one to be suspicious of the

condition of affairs, especially when peritoneal symptoms are present. But at this time the symptoms may be due to a rupture of the uterus or of intestinal adhesions. As I have already pointed out, intestinal occlusion is frequently the cause of peritonitis. On the other hand, the peritonitis may produce a retention of the fæces and gas,—in other words, giving rise to a secondary occlusion. Consequently, both these affections have a reciprocal action on each other and frequently it is difficult to tell with which one is dealing. Nevertheless, certain distinctive symptoms are met with distinguishing these two pathological conditions. In acute or hyperacute peritonitis, what frequently renders the diagnosis uncertain is that the pain rapidly becomes generalized throughout the abdomen and is greatly increased by palpation, while the distention is considerable. Constipation, which may be complete is, however, in most instances incomplete, a small amount of fæces may be passed or at least some gas; sometimes there is diarrhœa with bilious vomiting. This condition of affairs is preceded by a chill, the pulse is small and rapid from the commencement and the temperature subnormal. Finally, in the history of the case, it is often possible to elicit the occurrence of similar attacks or symptoms arising in the abdominal cavity, especially in the region of the appendix, an organ which is so often the cause of peritonitis.

In intestinal occlusion the pain is at first localized, there is not very marked pain on palpation, but the constipation is complete. By palpation one may find a tumor, a certain amount of distention, and sometimes Wahl's sign exists. The vomiting soon becomes fecal, but usually there are no chills, the pulse remains good for a certain time, and lastly, a most important fact to recall is that the temperature remains normal or subnormal. In point of fact the true distinctive diagnostic sign is the temperature.

Perityphlitis and especially appendicitis, which, of course, is far more frequent than the former, is occasionally very difficult to distinguish from intestinal obstruction. Then, too, it has been frequently encountered during pregnancy. However, if the diagnosis is uncertain, the same treatment applies to both cases. Sometimes one finds in the history of the case similar attacks. The commencement of the affection is sudden with a localized pain in the region of McBurney's point, but the point of pain naturally varies

with the localization of the appendix in the abdomen, there is abdominal distention, and in rare instances,—especially in these subjects,—a tumor may be felt in the right iliac fossa. Constipation is frequent and may or may not be preceded by diarrhoea.

Strangulated hernia is an infrequent complication of pregnancy, because the pregnant uterus pushes the intestine up into the abdomen and has a tendency to close the inguinal canals. Meyer has collected 27 cases during pregnancy, only three of them commencing during labor. Out of a certain number of cases of intestinal occlusion during pregnancy the diagnosis of strangulated hernia was made four times. In two of these cases after the abdomen had been opened adhesions were found uniting the intestine to the abdominal wall. In another case the hernia occurred during labor, and in still another there was an intestinal strangulation in an opening of the left broad ligament, which gave rise to pain on the same side extending down the left thigh. This patient was very stout, so that the hernia was with difficulty detected. In hernia there is usually severe, spontaneous pain, which is increased by palpation over the ring, while a distended irreducible tumor is detected.

Ectopic gestation may also give rise to symptoms simulating intestinal occlusion by the phenomena of peritonism, or more usually by rupture. Several cases have been reported demonstrating the difficulty in the diagnosis between intestinal distention and extra-uterine pregnancy.

Confusion may also exist between intestinal obstruction and the beginning of labor. In one instance the patient was eight months pregnant and dilatation of the cervix was resorted to, resulting in delivery of a living child with the death of the mother a week later. In another case of a primipara, sudden pain was complained of after labor began, the former in the form of violent colics; the patient soon became collapsed, was delivered of a living child and then died. The distinctive symptoms are the absence of uterine contraction and softening of the cervix in cases of intestinal occlusion. It must be admitted, however, that during labor a positive diagnosis is almost impossible. I would point out, however, that a severe sudden pain at the time of delivery was met with in one case.

One may also consider the case as one of uterine rupture or rupture of utero-intestinal adhesions. In the case of uterine rupture one observes an intense localized pain with a serious general condition, the uterus is difficult to map out, the pulse is small, and the temperature is subnormal, while there is a bloody vaginal discharge; the fœtus is easier to palpate under the abdominal wall and there is a complete cessation of uterine contractions.

I am aware of no case where a differential diagnosis between hepatic or nephritic colic and intestinal occlusion has been necessary.

The etiological diagnosis of occlusion presents considerable difficulty and has rarely been made before operation or autopsy. The causes giving rise to it may be classed in three principal groups, namely—compression producing a true occlusion, intestinal paralysis giving rise to a pseudo-occlusion and lastly, extra-uterine pregnancy and ovarian cystomata. In 14 cases I find that the occlusion was due, in one to a posterior parametritis, and in another there was compression of the intestine by a retroverted uterus. In 6 cases the physician was dealing with a strangulation resulting from adhesions, and for this reason one should always bear in mind the possibility of adhesions in cases having a past history of pelvic or abdominal trouble. During pregnancy the intestine is sluggish and the use of opium to combat pain may give rise to intestinal paresis resulting in symptoms which may appear serious. Three such cases have been reported. In one there was an evacuation of very hard fœces after five days' constipation. This occurred after delivery, which had been accomplished by version. In another instance symptoms disappeared after a miscarriage, which would probably confirm the diagnosis of occlusion from uterine compression. A case of pseudo-occlusion from intestinal paralysis should perhaps be placed along with the preceding case because the fetal head had become engaged at the time that occlusion was complete. It is probable that it compressed the intestine, because as soon as the child had been delivered by forceps the intestine emptied itself completely. This patient had fecal vomiting, a symptom which is not observed in pseudo-occlusion resulting from intestinal paralysis. Rector has pointed out that the intestinal paresis may arise after the application of the forceps. This phenomenon is more apt to occur at term in patients who have presented obstinate constipation during

pregnancy. The diagnosis will be made from the absence of fecal vomiting, the irregularity of the intestinal functions, to which are added periods of constipation lasting for several days. But in reality it is difficult to ascertain the cause of the occlusion, whether or not it is true or false,—and in point of fact two cases out of four of pseudo-occlusion have been operated on.

I am aware of 7 cases of extra-uterine pregnancy which produced intestinal occlusion, either by compression on the rectum, from adhesions, or by the rupture of the fetal sac. On these cases I shall not insist because they do not strictly enter into the subject of this paper, and I would merely recall one case where the diagnosis of rupture of an ectopic gestation was made on account of the pain, syncope and the general symptoms, when in reality the case was one of occlusion. One should always endeavor to elicit the ordinary symptoms of ectopic gestation in the patient's past history, such as the irregularity of the menstruation, paroxysmal pain and bloody vaginal discharge. I would also point out that torsion of the pedicle of an ovarian cyst may give rise to symptoms closely simulating intestinal occlusion or appendicitis.

The diagnosis of the seat and nature of the obstruction has been very rarely made and usually operation is undertaken without any precise idea as to the localization. Fecal vomiting is encountered when the occlusion is seated in either the small or large intestine and some have thought that suppression or diminution in the quantity of urine indicates an obstruction seated quite high up in the small intestine, but I believe little reliance can be placed on this symptom. As to the diagnosis of complications, especially peritonitis and premature labor, the latter is easy to recognize and especially so from the point of view of the prognosis. Peritonitis I have already considered and have pointed out the difficulties which one encounters in the determination of the exact relationships it may have with occlusion.

Intestinal occlusion is serious for both the maternal and fetal life and out of 50 cases the mother has succumbed thirty-six times, while 27 infants were lost, thus making the maternal mortality 62 per cent. and that of the children 46 per cent. The interference which was undertaken in 36 cases gives the following results: For the mother there were 18 deaths and 18 recoveries, while for the

child there were 16 deaths and 20 recoveries, thus making the maternal mortality 51 per cent. and the infantile mortality 45 per cent. Of 24 cases where no operation was undertaken only 6 mothers were saved, while the child was saved in 9 instances. Consequently we have here a maternal mortality of 78 per cent., that of the foetus being 60 per cent.

During pregnancy intestinal occlusion plays an unfortunate part as far as the mother is concerned, because out of 41 pregnancies it resulted in 9 miscarriages and 6 premature deliveries. In the latter, if the child is near term, it may survive, even if the mother is delivered during collapse. But for the mother the prognosis appears quite as bad in all periods of pregnancy, the latter two months of gestation being particularly sombre, because, at this time, it would appear that the frequency of occlusion is the greatest. Beside the instances of miscarriage and premature labor, there are a certain number of cases where induced labor has been attempted. Now, although this interference is relatively favorable for the child during the last month of gestation, the same cannot be said for the mother, as only 2 were saved out of 6 cases of induced labor. It has been noticed that generally following this interference an immediate improvement in the mother's condition took place, but this was of short duration and the process soon continued its fatal progress. On the other hand, operative interference does not seem to aggravate the prognosis in those instances where it has been resorted to early in the case. At the time of labor the prognosis is still worse, and out of 3 cases 2 mothers died, but all the children were saved. Labor does not appear to be influenced by the presence of an intestinal occlusion and follows its ordinary course. During the post-partum a cure was obtained 6 times out of 10 cases and the 4 deaths were due either to noninterference or an incomplete late interference. I would observe that this applies also during pregnancy, and the reason that the results obtained have not been more favorable in those cases operated on is because the mother was already in a desperate condition at the time the interference took place.

We now come to the treatment. The pain and vomiting may be calmed by opiates, etc., but as we are dealing entirely with a surgical affection, I shall at once pass to the curative treatment. The gravid uterus appears sometimes to play an important part in

the genesis of intestinal obstruction, so that some have believed that by emptying it of its contents, the symptoms arising from the occlusion might disappear. Now in point of fact this is entirely erroneous, and I have already shown that out of 6 cases of induced labor only 2 mothers survived. In the 4 cases remaining, death took place, and consequently it becomes evident that this is an illogical treatment which has already been condemned by other surgeons. Medical means, such as purgatives, enemata, irrigation of the stomach, and hot baths, have been employed and will probably be in the future on account of the difficulties of etiological diagnosis and the very capricious developments of the symptoms of occlusion. But these means which have been particularly resorted to by English surgeons have given universally bad results. Washing out of the stomach has occasionally produced an abatement in the patient's sufferings, but the great trouble here is that one may be led to believe that there is a real improvement, which is not the case.

When a patient presents symptoms pointing to an intestinal occlusion during pregnancy, electricity may perhaps be tried, but I would greatly hesitate to recommend it, although one or two favorable cases have been reported.

When there is retroversion of the uterus one may attempt its reduction by bimanual reposition, the patient being preferably in the knee-chest position.

Theoretically, it might be said that medical means could be applied to intestinal obstruction, while surgical procedures should be used in true occlusion, but as I have already pointed out it is frequently very difficult to make a correct diagnosis, and some cases of pseudo-occlusion have been operated on, but it is better to err on the safe side and intervene, even if one discovers his error after the abdomen is opened.

I have pointed out when speaking of the prognosis that the maternal mortality in cases not operated on was 78 per cent., while in those instances where interference was undertaken, the mortality was 51 per cent.; while as to the infantile mortality, it is represented by 60 per cent. and 45 per cent. respectively. Now, in all the fatal cases where interference has been resorted to, the outlook would have been much better if the former had been undertaken at

the beginning of the symptoms. In some of these fatal cases, a fatal complication arose, such as peritonitis, rupture of the intestine during the operation, or rupture of the uterus from adhesions.

As far as the question of the presence of pregnancy is concerned, it is far from being a contraindication to a surgical interference and numerous operations, either on the intestine or the adnexa during gestation have in no way interfered with the progress of the latter.

I must confess that in practice the proper time for interfering is somewhat difficult to estimate in cases of intestinal occlusion arising during pregnancy, but for general purposes, I would say that one should be guided according to the patient's general condition, vomiting and constipation. I believe that one should not attribute too great value to pain or to fecal vomiting, because, although in most cases of true occlusion they appear early in the process, they may arise quite late or even be completely wanting. On the other hand, the absence of the passage of gas is certainly an important symptom.

As to the interference itself,—as the seat of the obstruction is generally unknown before the abdomen is opened, it is better to begin by an incision extending from the umbilicus to the pubis and, if the obstruction is seated high up, the incision can be prolonged towards the sternum. One should carefully explore the abdominal cavity, particular attention being paid to the hernia orifices, or those occurring accidentally from pregnancy, and if nothing is found the peritoneal folds and intestine must be carefully inspected. When the obstacle has been found, it should be done away with, but the operation must be carried out rapidly and still with care. At all events the operation must be carried out as quickly as possible, because in most instances one is dealing with patients who are in a lowered vital condition and quite incapable of standing a prolonged interference. If the obstacle is seated high up in the gut, so that an artificial anus cannot be made, intestinal resection and anastomosis must be done and, if necessary, resort must be had to one of the mechanical devices in the form of an intestinal button. Of all those on the market, for simplicity and ease of application I would particularly recommend that invented by Harrington. In some cases at the end of pregnancy the

Cæsarean operation may be indicated in order to give more room for the interference necessitated by the occlusion.

When the occlusion occurs during labor, it is perhaps better to wait until delivery has been accomplished and immediately afterwards the abdomen may be opened. Occlusion during the post-partum should receive the same attention and treatment as during pregnancy.

Genito-Urinary Diseases

RUPTURE OF URETHRA: ACUTE URINARY RETENTION: SECONDARY SYPHILIS *

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CASE I.—You will recall, gentlemen, that one week ago to-day I showed you a white man upon whom we had previously performed perineal urethrotomy for relief of retention of urine resulting from rupture of the urethra. I wish to report this morning that the patient is doing nicely. When before you last week you will remember the incision in the perineum had not yet healed, although the man was voiding the larger portion of his urine through the urethra. I saw the patient yesterday; the incision has completely healed, and he is now voiding his urine entirely and without difficulty through the normal channel.

The history was that thirteen days previously, while at work in Cincinnati, Ohio, this man had fallen astride a piece of timber in such a way that rupture of his urethra in the perineum had taken place, and as a result he had acute retention of the urine. During the time he remained in Cincinnati after the injury, in order to afford relief, catheterization had to be resorted to three or four times in each twenty-four hours. He became profoundly septic, and as his condition was growing progressively worse, his wife decided to bring him to Louisville. I saw him thirteen days after the accident occurred, and that he had survived the injury seemed rather remarkable. His condition was extremely serious. As you know, in cases of this kind, there is infection, inflammation, swelling, interference with the circulation, gangrene of the parts within a few days, and if unrelieved death of the patient promptly

* Clinical Lecture delivered at the University of Louisville Medical Department.

occurs. The wonder is that he was able to be catheterized at all, as there was a swelling containing blood-clots as large as a goose egg in his perineum; but the catheter followed the roof of the urethra, which was not ruptured, and passed into the bladder.

At the time of the operation the floor of the urethra in the perineum was found to have a rupture admitting two fingers, the parts were greatly distended and distorted, and I evacuated a great quantity of old blood-clots. I performed external perineal urethrotomy, according to the method of Gouley; and no attempt was made to suture the ruptured urethra, because the parts were infected, and because the time that had elapsed between the receipt of the injury and my seeing the patient had been so great that the vitality of the tissues was very poor, and they seemed to be on the verge of gangrene. After cutting into the perineal swelling the clots were evacuated and the grooved staff was then visible through the ruptured urethra. A No. 28 French soft rubber catheter was introduced through the ruptured urethra into the bladder and allowed to remain one week. The bladder was irrigated twice daily through this catheter; and hot moist antiseptic dressings were kept applied until the vitality of the tissues was improved and the swelling had greatly subsided.

I wish to emphasize at this point the necessity of the passage of large-sized sounds on this patient over a considerable interval of time. This after-treatment has equal importance with the operative, and we can not hope for good functional results without persistence in the passage of sounds. I am now passing at intervals of a few days a No. 30 F. sound, and expect to continue to do so for possibly two months, and then watch his progress at longer intervals.

CASE II.—This man is aged thirty-seven years, and presents himself before us this morning with acute retention of the urine. He tells us that he has been unable to void any urine since early yesterday afternoon, with the exception of a few drops this morning. He admits having had specific urethritis about a year ago, that this was his first and only attack. Of course, in patients of this class, the statement that he has suffered but one attack of gonorrhoea must always be taken *cum grano salis*. He states that he has had more or less difficulty in urination for the past year,

that this was particularly true during such times as he was drinking rather freely. He claims, however, that for the past eight months he has been a teetotaler.

The question to be decided here is, to what cause is the urinary retention due? We will endeavor to make the diagnosis before the class, just as would be done if this patient had been seen at the office. Of course the indication is to relieve the retention by the most appropriate means, and this should be done at once if possible. Retention of the urine in this case may be due to a posterior urethritis, probably complicated by prostatitis; it may be due to an impermeable stricture; it may be due to an enlarged prostate; or it may be due to presence of a stricture with an attending urethritis posterior to the stricture. We will first endeavor to relieve the retention by passage of a soft rubber catheter. Failing in this it will be necessary to resort to other measures.

On account of his age we would hardly think this man has an enlarged prostate, although prostatic hypertrophy has been known to occur in younger men. It is evidently not due to alcohol, as he tells us he has not been addicted to its use for some time. There may be a posterior urethritis; the weather being cold, a chilling of the body may have caused congestion and swelling of the caput gallinaginis and about the vesical orifice, which would account for the acute retention. Oftentimes the passage of a catheter, thus overcoming the acute retention, will afford relief for some time.

In our examination it is important to note if there is present a vesical tumor in the infrapubic region. Inspection does not reveal the presence of an enlargement, and palpation is negative, but there is distinct flatness on percussion and the bladder is considerably increased in outline. The distention of the bladder is not great enough to cause distinct bulging, but by percussion we are able to outline it.

The first thing we notice about this man's penis is a constricting meatus. In catheterizing a patient always remember the necessity for using aseptic precautions. I doubt very much whether we will be able to introduce the catheter in this case. We meet with an obstruction which I take to be located in the bulbar portion of the urethra. We must not overlook the fact that this man gives a history of urethritis beginning about a year ago, and taking

this into consideration the most natural assumption would be that the retention is due, as mentioned a moment ago, to a posterior gonorrhœal urethritis, either that alone or, in addition, the presence of a stricture.

Where patients come to you and it is found necessary to introduce a metal catheter without a guide, remember that extreme care must be observed in order that no damage may be done to the urethra. Of course all of you understand the method of introducing the metal catheter or urethral sound, therefore repetition is unnecessary. Always keep your instrument in the median line close to the abdomen as it is passed downward until you meet with resistance before bringing the handle over in the direction of the feet, by this means you can always determine when the tip of the instrument is in the bulbomembranous portion of the urethra. If you are not able to determine whether the point of your instrument engages the lumen of the stricture, it is well to pass a filiform and guide your instrument over it, not using any force if you meet with any obstruction. It is well to remember that your filiform is very apt to engage a follicle in the urethra, and sometimes there is experienced considerable difficulty in introduction of the filiform. Failing to enter the bladder with either a soft rubber or a metal catheter, we have now introduced a filiform which we find passes readily and easily into the bladder. We then pass a Gouley grooved catheter staff over this filiform and by this means may be certain that we will reach the bladder. In those cases where we have to relieve acute retention, we may use "gentle force" in passing the stiff catheter, provided we have a guide; but it would be inadvisable to use any force with a metal catheter without a guide because of the liability of making a false passage. The urethra posterior to an old stricture becomes dilated; thinning of the tissue occurs; and even in front of the stricture the urethral wall may be so friable that introduction of your instrument may make a false passage, consequently extreme care should be used in these cases.

The Gouley catheter staff is an instrument that I use frequently in performing external perineal urethrotomy. You will remember I told you at our last clinic that Gouley invented this instrument in 1868, so it is not a recent invention; and you are all

probably more or less familiar with the instrument, the indications for its employment, likewise with the technic and manner of its use.

There is one precaution to be observed in a case of this kind, where there is extreme distention of the bladder, especially if this distention has persisted for some length of time. We should not in our anxiety to afford immediate relief evacuate the entire vesical contents too suddenly, because sudden relief of the intra-abdominal pressure will in some instances bring about syncope and death of the patient. In the case before us, however, distention has not been so extreme; it has not existed for a long time; consequently we have no fear in completely emptying this man's bladder. The urine which is draining away is clear, showing that we have inflicted no damage in our manipulations.

This is a case of retention from stricture in the bulbomembranous portion of the urethra, and it is well to remember that stricture in this locality is especially amenable to cure by dilatation. The first step in the treatment of this case, however, after watching the patient for a few days, is the performance of a meatotomy, because the meatus is so narrow that it would be quite impossible to treat his stricture by dilatation, since the meatus would not permit introduction of sounds of the required size.

The bladder has now been completely emptied of its contents, which I am sure affords great relief to the patient. Whenever a patient has anything wrong with his urinary apparatus or bladder, especially such as this man had, you can see the agony expressed in his countenance. Relief of the retention at this time by the means we have employed will probably enable him to evacuate his bladder without any trouble for the next few days. Of course the patient should be carefully watched; he should stay in a warm room and not expose himself to further chilling, and it goes without saying that he should not drink alcoholic beverages. A great many patients of this kind have the idea that "common" beer will not be injurious to them!

The pressure exerted by the metal catheter we have introduced will have its beneficial effect upon the stricture. The size of this catheter is No. 12 French. The after-treatment of this case will be the maintenance as far as may be possible of urinary antisepsis

by the administration of hexamethylene-tetramine, or he might be given if preferred boric acid and salol. The urotropin I usually give in five, seven and a half, or ten grain doses three to four times a day. Boric acid and salol may be given in the following formula: boric acid, ten grains; salol five grains; three or four times a day. We must also include in the after-treatment of this case treatment of the stricture by gradual dilatation, and I anticipate little or no trouble in securing a good result by this means. We will have the patient return to us on our next clinic morning; we will then perform a meatotomy so that dilatation of the stricture may be carried to the required point. In the meantime we will pass the largest sound we can without subjecting the patient to any especial discomfort, and continue the passage at intervals of five to seven days of sounds gradually increasing in size.

CASE III.—This colored man, aged twenty-four years, has not previously visited the clinic. We will elicit his history as far as we can by asking questions. A little over two months ago he states he first noticed a sore on his penis. It is well always to remember that in this class of patients cerebration is such that it is difficult to obtain anything like a definite and positive history, but it is always advisable to make the attempt. This man admits having cohabited with so many women that it is impossible for us to determine the period of incubation of the disease from which he now suffers. It must be borne in mind that there are two common venereal sores with which we are called upon to deal, one is chancre, the other chancroid. The period of incubation of a chancroid is commonly stated as a few days, but as a matter of fact it may appear within a few hours after exposure. On the other hand, chancre has a longer period of incubation, always more than ten days, the average being twenty-one days.

In addition to his other troubles we find this man has a condition of paraphimosis, by which we mean that the foreskin is retracted behind the corona glandis and the patient is unable to replace it. This has in a measure contributed to the rather extensive œdema which we find present. It is possible in this case, however, to replace the foreskin, and the swelling present will no doubt markedly improve when that is done.

We find that this man has the remains of a chancre on his

penis. It is situated in the most favorite location for genital chancre, being in the sulcus of the mucous membrane of the foreskin back of the corona. There is still considerable induration to be noted. The induration of a chancre is best detected by grasping the tissues wide of the sore and palpating toward the sore, by this means the cartilaginous hardness will be felt sharply, definitely, and distinctly. This sore has existed for some weeks, consequently induration is not now as marked as it was earlier.

As you know chancre is the first visible evidence of syphilis, next we have the external or cutaneous manifestations. About the time the chancre ceases to be hard and indurated, the secondary symptoms appear. In this case the induration of the chancre has not entirely disappeared, and we have at the same time the characteristic secondary symptoms. The roseola is quite generally distributed over this man's entire body. We also infer from the patient's statements that he had another infection about the time this chancre appeared. He tells us that he had a bubo in one groin which opened spontaneously and discharged a large quantity of pus. We find he now has inguinal adenitis on both sides, and you will remember that in syphilis this is generally not accompanied by any pain, that also in syphilis the glands do not as a rule suppurate, that regardless of the location of the penial sore we have adenitis on both sides, in contradistinction to the adenitis accompanying chancroid, which as a rule appears on the side corresponding to the location of the chancroidal sore. In other words, if there is a chancroid on the right half of the penis, the inguinal adenitis as a rule is on the right side; if the chancroid is located on the left, half of the penis, the adenitis will more than likely be confined to the left groin. This is the rule, but, of course, there are many exceptions. In syphilis, however, we always find the adenitis involving both groins, and as already mentioned the adenitis due to syphilis is non-suppurative and painless unless the chancre is accompanied by another infection. In adenitis due to syphilis the glands generally appear like small split peas at first, involving but one chain of glands. In chancroidal adenitis, while all the glands may be slightly enlarged, generally there are one or two much larger than the others, and they are always painful, the enlargement is more distinctly inflammatory in character, and if resolution does not

promptly take place the glands suppurate and break down. In the adenitis due to syphilis the skin is freely movable over the enlarged glands, the skin is not adherent; but in chancroid, as the inflammation progresses, we have a periadenitis with attachment of the skin to the gland. As already indicated in the adenitis due to syphilis suppuration rarely occurs, and when it does it is due to another infection.

As is usual we will probably find enlargement of the lymph-glands remote from the site of the chancre in this case. We observe that this patient has some enlarged glands in his neck, the epitroclear gland is also infiltrated. The enlargement of the lymphatic system remote from the site of the primary sore is taken as being almost pathognomonic of syphilis, and this general adenitis usually becomes manifest slightly before appearance of the secondary eruption. Therefore, when we discover enlargement of lymphatic glands remote from the site of the primary lesion, and especially when the epitroclear gland is involved, even though up to that time there has not been noted any secondary eruption, we can be reasonably certain that the patient has syphilis and that the eruption will make its appearance in a short time. In a typical case the remote glandular enlargement develops about five weeks after appearance of the primary sore. You will remember from your studies of this subject that the secondary eruption of syphilis makes its appearance about six weeks from date of infection, that the glandular involvement may be detected five weeks after the primary lesion. By watching the patient carefully we are often able to forecast the diagnosis, if I may be permitted to use such a term, and our diagnosis is confirmed by appearance of the secondary eruption.

Examination shows that there are no mucous patches in this patient's mouth. In the matter of treatment, we will start this man on hydrargyri iodidum flavum, one-quarter grain three times a day. We will have him return to the clinic weekly that we may observe the disappearance of the symptoms, and also watch further progress of the disease and if necessary change our treatment.

Proctology

REPORT OF A CASE OF TUBERCULAR STRICTURE OF THE RECTUM, WITH EXCISION

BY SAMUEL T. EARLE, M.D.

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I WISH to call especial attention to this case on account of its rarity, as will be seen by the few properly authenticated cases that I have been able to collect, after quite a thorough search through recent literature. Tuttle in "Diseases of the Anus, Rectum, and Pelvic Colon," p. 469, speaking of tubercular stricture, says: "I had the opportunity to examine the bodies of a number of patients who died from tuberculosis, and in four instances, met with undoubted fibrous stricture existing in well-developed tubercular ulcers; in two of the cases the stricture was in the pelvic colon, and the remaining two in the rectum. The histological examination of these specimens demonstrated the existence of tubercle bacilli, giant-cells, and embryonic cells, outside of the area of ulceration."

In this connection I would state, that of 260 autopsies made at Bayview Alms House in 1884 and 1885, in which there were 26 cases of tubercular ulceration of the rectum, we did not find any tendency to the formation of stricture of the rectum in a single case. The only cases of tubercular stricture of the rectum, that I have found mentioned in "The Index Medicus," during the last ten years were those referred to by Dr. Ruben Peterson, of Chicago, Ill., in an article on the Etiology of Non-malignant Strictures of the Rectum (*Journal of The American Medical Association*, vol. xxxiv, p. 259), he states, after referring to several cases of supposed tubercular stricture of the rectum, which, however, were not well authenticated, that it remained for G. Sourdille (*Bull. de la Soc. Anat.*, Paris, 28 December, 1894) to demonstrate the tubercular nature of a stricture of the rectum, a piece of which he removed for micro-

scopical examination during a posterior rectotomy. Inoculations also showed the tubercular nature of the disease. Subsequently Sourdille (*Thèse de Paris*, 1895) exhaustively considers the question of tubercular stricture of the rectum, and reviews the records of seven such cases. An interesting feature, emphasized by the same author, is that the starting point of the disease may not be a tubercular ulceration, but a submucous infiltration of the walls, gradually ending in sclerosis and contraction; a condition described by Coquet (*Thèse de Paris*, 1894) as Hyperplastic Tuberculosis, which is characterized by extensive formation of fibrous and tuberculous granulations in the wall of the gut.

A. Ernest Maylard (M.B., B.S., London) in his recent work on "Abdominal Tuberculosis" (which has just appeared in 1908) does not mention a single case of tubercular stricture of the rectum, but speaks of numerous strictures of this origin of the small intestine, and the large bowel, as far as the splenic flexure. He divides tubercular stricture of the small intestine into two distinct classes: first the simpler form, those that are due solely to the result of a healed lesion; secondly, that form which is more commonly met with, and represents also the more striking characteristics of a tuberculous process, viz., the so-called hyperplastic form. It would seem as if in strictures of this class, the active process of ulceration remained in abeyance, while a slow progression of inflammatory changes continues, consisting in exudation and organization. The result is, that the bowel gradually becomes obstructed by the encroachment on its canal, by the increased thickness of its parietes. To the naked eye the appearances are very much those of colloid carcinoma.

It will thus be seen that the last three authors agree as to the character of the pathological changes that are commonly met with in tubercular stricture of the intestines, which corresponds exactly with the case I am about to report. The two cases mentioned by Tuttle, and the seven cases reported by Sourdille, are the only well authenticated cases of tubercular stricture of the rectum that I have been able to find.

General History.—(From the family physician, Dr. Henry J. Hahn.)—R. F. W. came to me for treatment July 2, 1908. Complained of having felt sluggish and feeble for several weeks. He

thought he had malaria. Physical examination showed no liver or splenic enlargement, and the examination of the abdomen was negative. Lungs were clear, except for rough breathing over the left apex anteriorly and posteriorly, with prolonged expiration. Temperature reached its maximum of 101.5 on July 5, three days after I saw him, then it cleared up by lysis, and was normal within ten days from the onset. There is no cough now, only occasionally clearing of the throat.

He gave a history of having had a cough about eight years ago, which lasted for more than six months. This was followed a year later by an attack of purulent tonsillitis, the abscess rupturing spontaneously. About that time he lost fifteen pounds in weight, which he never regained, up to the time of the operation.

When the diagnosis of tuberculosis of the rectum was made, I began the injection of tuberculin, using Koch's T. O. Beginning with a dose representing .001 mg., this was increased daily, until he is at present taking 50 mg. without reacting. Examination of the lungs, December 1, 1908, shows the same to be clear throughout. He has increased in weight about thirty pounds.

Special History.—About ten years ago, his hemorrhoids were injected by a 'quack,' presumably with a solution of carbolic acid; this was followed by excruciating pain, and considerable swelling, which only subsided after several weeks; about one year afterwards, he was operated on by a general surgeon for stricture of the rectum, doing what appeared, from the scar-tissue, a proctotomy. Since that time the constriction has gradually increased, until the lumen of the bowel, at this point, is only about half an inch in diameter; the most contracted portion of the rectum is about three inches from the anal margin, with the infiltration of the tissues growing less, until it gradually disappears about one inch below the stricture. There are frequent attempts at stool, which are followed by the passage of a small amount of fecal matter, with considerable mucus, which is sometimes streaked with blood.

Operation.—Under ether anæsthesia I operated by the perineal method. First, an incision was made posteriorly, from just above the stricture, through the sphincters at the posterior commissure, down to the tip of the coccyx; a circular incision was then made through the entire thickness of the bowel, entirely around the rec-

tum, just above the internal sphincter; the rectum above this point was then dissected out, to several inches above the level of the stricture. The resected portion of the rectum was now excised, at a point just above the level of the stricture; the proximal end of the bowel was then drawn down and sutured, with chromicized catgut, to the mucous membrane, which had been left by the first circular incision, covering the sphincters. The ends of the divided sphincter at the posterior commissure were then brought together and sutured, first with chromicized catgut, and these were reinforced by a deeper silver-wire suture. The incision in the tissues, between the sphincter and coccyx, was left open, to heal by granulation, and drainage-tubes were introduced through this incision on either side of the rectum; there was also a drainage-tube introduced anteriorly, between the proximal and distal ends of the excised portion of the rectum walls. The latter was removed in three or four days, and the posterior tubes after a week or ten days. The results were all that could be desired; the proximal and distal ends uniting very promptly, and the posterior incision in about one month. There was very slight separation between the divided ends of the sphincter ani, not more than is generally found following an ordinary operation for fistula in ano, and he has perfect control over normal stools. Up to the present time, four months from the date of the operation, there is not the slightest tendency to a recurrence of the stricture.

The Gross Condition of the Specimen.—The length of the excised portion of the rectum was about three inches, and the infiltration was very extensive, including all the coats of the bowel, and also extended, to a limited extent, into the cellular spaces beyond. The naked eye appearances were similar to those of syphilitic infiltration.

Pathological Findings.—The examination of the specimen was made by Dr. Jose L. Hirsh; the following is his report:

Examination of the tissues from R. F. W. shows several areas of beginning caseation, and others with rather well-formed early tubercles; other areas show considerable increase in fibrous elements. I take the condition to be tubercular stricture of the rectum.

Rhinology

SOME REFLECTIONS CONCERNING THE ETIOLOGY AND TREATMENT OF THE NEUROVASCULAR DIS- TURBANCES OF THE NOSE: HAY FEVER, PAR- OXYSMAL SNEEZING AND RECURRENT RHINORRHOEA

BY CHARLES PREVOST GRAYSON, M.D.
of Philadelphia

I HAVE ventured to bring the subject embodied in the title of this paper before an audience composed mostly of practitioners of general medicine, because I have for a long time thought it one, the study and management of which should not be wholly abandoned to the specialist. If it had happened that during the past twenty or more years the rhinologist had succeeded in adding anything material to our knowledge of or our ability to control the diseases I have mentioned, he might perhaps make a reasonable claim that they should as a matter of routine be transferred to his care, but it may as well be frankly confessed that in all these years he has accomplished nothing that can be regarded as sufficient to justify such a claim. It cannot be denied that he has by means of the local measures at his command relieved many cases of hay fever, and perhaps you may be willing to grant that a pitifully small percentage have been cured; but more than this it would be unwise, not to say rash, for him to insist upon. At the annual meeting of the American Medical Association at Atlantic City in 1907, a number of papers were read in the Rhino-Laryngology Section concerning hay fever, and in closing the ensuing discussion Holbrook Curtis said: "Hay fever is a most interesting subject, but the more one studies it the less he knows about it." This candid statement, almost epigrammatic in its brevity, fully summed up the actual value of the papers that had just been read—in so far, at

least, as concerned any genuine contribution to our existing knowledge. For the cure of hay fever the laity and the profession generally have for a long time been looking to the rhinologist for that therapeutic *rara avis*, a "specific." It has not been forthcoming. Your hopes concerning it have doubtless been raised again and again by some plausible promise from the office or the laboratory, only to be as often dashed by its want of fulfilment. It is for this reason, and also because I have always been a dissenter as to the curative value of merely local or symptomatic treatment, that I would appeal to the general practitioner for counsel and assistance. And I do this the more boldly because I hold him responsible to a limited extent for the specialist's failure. In this connection I hope I may be pardoned if I regretfully allude to the fact that the average general practitioner knows so little about the nose, so little of its own anatomy and physiology, and even less of its anatomical and functional relations to its neighboring cavities and organs. He seems to have scarcely more than begun to realize the very serious influence that the diseased nose and its accessory sinuses can exert upon the general health, and if this be true, as I have considerable reason to believe it is, of the ordinary catarrhal inflammations of this portion of the upper air tract, it is even more emphatically true of the several neuroses that affect it. If for a moment we consider hay fever, paroxysmal sneezing and simple recurrent rhinorrhœa collectively, I need not impress upon you,—at least, upon those of you who have ever been afflicted by any of them,—the amount of discomfort, annoyance and even actual suffering that they are capable of inflicting. They are all closely allied in that their symptomatology is dependent upon disturbance of the vasomotor mechanism of the nasal mucous membrane; that they possess in common, though in varying degree, the feature of periodicity; and that almost invariably they occur in those who are already accursed by the "neurotic temperament." Concerning this so-called temperament, I have become a pronounced sceptic. I have encountered it, as you all have, again and again, and although I am perfectly willing to admit that my scepticism may carry me too far, yet the more I have seen of it and studied it, the more confidently I have come to regard it as a convenient and somewhat charitable cloak for the direct and disastrous consequences of oft-repeated violations

of the most ordinary and fundamental laws of personal hygiene. So far, therefore, from feeling any compassion for the subjects of this fancied temperament, I am the more inclined with each day to reproach and rebuke them. I am careful to say subjects, not victims, for in the vast majority of cases, I view them not as the innocent victims of an inherited temperament, but rather as the guilty creators of a dyscrasia that is clearly attributable either to their own ignorance or to their own weaknesses and deliberate follies. Those of us who are fully conscious of and who frankly admit our own hygienic frailties neither seek nor expect sympathy when inevitable punishment overtakes us, and as for myself, my own nose has often enough been the humble agent of retributive justice to have taught me that many other noses have served their owners in the same way. Even in those who have a perfectly clear hereditary title to their nerve irritability, there can be no doubt that this is intensified by indiscretions and blunders of a hygienic nature, and that it can be greatly modified or subdued by their correction. It seems to me, therefore, that a thorough appreciation of the genesis of the neurotic factor in the causation of these nasal neuroses is necessary if we would formulate a definite and rational plan of treatment for their cure. My own studies and conjectures as to the origin and development of this factor have finally crystallized into the conviction that both its birth and subsequent growth are to be attributed to a chronic autotoxæmia. Without this systemic condition, I believe that the neurotic nose would be unknown.

If you will permit me to indulge in metaphor, it is this toxæmia that supplies both the motive and moral of the neuronasal drama, the first scene of which is enacted in the gastro-intestinal tract. Instead of but one villain, this play possesses a whole group of them and, of these, dietetic indiscretions, frequent indulgence in one or more of a large variety of emotional, alcoholic or narcotic excesses, insufficient sleep, neglect of exercise, and defective elimination are probably the most vicious. It is through their collusion in the prologue that the first act opens with the birth of intestinal catarrh and constipation. During the second, intestinal toxins, systemic poisoning and impaired nutrition successively make their entrances, and when the curtain falls upon the third and last, it is

upon a tableau in which sensory nerve hyperæsthesia and vasomotor demoralization are hailing the appearance of the nasal neurosis.

Almost the one etiologic feature of hay fever that distinguishes it from paroxysmal sneezing and recurrent rhinorrhœa is the idiosyncrasy or special susceptibility of the patient to the disturbing effects of certain pollens, and there is a sub-class of this *genus irritabile* composed of those who find their external irritant in the emanations from certain animals. Of course, it is in those who are sensitive to the pollens that the element of periodicity is most distinct, the annual development and duration of the disease being almost limited to the period of ripening of the offending flowers, weeds or grasses. When it is the horse, the cat or some other animal that supplies the excitant, the attack is coincident with the exposure and its duration is apt to be limited to the ensuing few hours or days. In the other nasal neuroses the exciting factors are almost wholly of internal origin, and their irregular periodicity depends upon the time needed for such an accumulation of these toxic materials as will suffice to provoke an eliminative explosion.

With reference particularly to hay fever, I have said elsewhere that "although it may seem useless to indulge in any speculations as to the nature of idiosyncrasies, yet I have often thought that if we,—as all of us do,—have certain conscious likes and dislikes, may it not be possible for us to have others also that are subconscious? Cannot our respective mucous membranes, for instance, owing to some individual peculiarity of structure or innervation, have certain antipathies of their own of which we may be wholly unaware until lowered vitality, increased peripheral nerve irritability and lessened central control permit them to emerge from their previous obscurity. I have fancied that we may either inherit or acquire in some way the seeds of these idiosyncrasies, but that these may lie fallow and inert until they are fertilized by and spring into life and offensive activity from a soil of poisoned and debilitated nerves." So far from being rare, cases are numerous in which hay fever has required several years for its complete development. During two or more successive summers its symptoms may have been scarcely more annoying or persistent than those of an ordinary commonplace coryza, but with the progressive lowering of nerve nutrition and nerve tone, the annual attacks have

become more pronounced and prolonged, until finally a point has been reached at which this periodical suspension of vasomotor inhibition has become so absolute that the nature of the disturbance could no longer remain unrecognized.

If I am so fortunate as to have any of you in agreement with me in what I have said up to this time, I can scarcely believe that you will disagree with me in what I shall say in conclusion concerning the treatment of these maladies. If of the three nasal neuroses that I have mentioned we select hay fever as the type, that which may be said of its treatment will be equally applicable to the other two. I have unequivocally committed myself to the opinion that in all of them a general autotoxæmia is chiefly responsible for the central nerve instability that is invariably present and that is essential to their development, and that to this systemic condition a great number and variety of causes, principally of a hygienic nature, contribute. Perhaps I may here add parenthetically that although some form of nasal abnormality is usually present, it may, at times, be so insignificant as to be almost if not quite inappreciable.

If there be any disposition among you to admit that my views as to the etiology of these affections are well-founded, I ask you if it is possible to reconcile with them a belief in the existence of any one remedy of specific virtue for their cure. I yield to no one in my respect for the motive and the industry of those misguided enthusiasts who are striving to provide us with such a remedy, but it nevertheless seems to me the apotheosis of absurdity to overlook or neglect rational therapeutic and hygienic measures in the search for so irrational and impossible a remedy. A dozen palliatives have been and dozens more may be discovered, but the one longed for specific will continue to be longed for until fatuous hope shall give way to reason and common sense. "Pollantin," as a specific, is already fast following in the almost vanished wake of "Elixir Ambrosia," and such must be, I think, the inevitable fate of every new remedy that shall have specific power claimed for it.

Divested of all theories, therefore, it seems to me that the therapeutic problem resolves itself into two primary factors,—the restoration of a normal nose, the restoration of a normal body. The accomplishment of the first depends almost wholly upon the specialist, that of the second should be shared almost equally by

the patient and his general medical attendant. It is seldom if ever that the rhinologist encounters any serious difficulty in relieving the nose or nasopharynx of any distinct lesion or persistent vascular disturbance that can be held accountable for that hyperæsthesia without which the symptom-complex of these nasal neuroses is never known to occur. His part of the treatment, therefore, though important is comparatively simple. It is, then, not the specialist but the general physician who should assume the more important and the much more difficult task of restoring the normal body. It is he who should elicit from the patient, or, indeed, who should be already familiar with, his habitual hygienic errors or the deliberate vices of which he is guilty. The two most serious difficulties with which we have to contend are,—first, to make the patient fully understand and appreciate his personal responsibility for his susceptibility to the disease; and second, to induce him wholly and permanently to abandon those violations of Nature's laws that have brought him to this condition. In other words, we must endeavor to bring about a complete reformation of our patient's life wherever reform may be needed, we must effect for him a sort of hygienic *renaissance*, and to succeed in this it is necessary that we instruct him first and inspire him afterward. When his understanding has been thus enlightened and his enthusiasm aroused, our work is finished and it remains for him to do the rest. He cannot now fail to recognize the necessity for removing from his scheme of life everything that can lessen to any extent his general vitality and vigor and for adding to it everything that will contribute to his physical and more particularly his nervous welfare. To educate and impress the patient to this extent, however, usually requires a greater air of authority and infallibility in matters of general medicine and hygiene than the average specialist can successfully assume, and therefore it is to his general medical adviser that we must look to secure the patient's faithful and intelligent co-operation. This being gained, it will be usually but the question of a reasonable time for the digestive tract to be restored to a state of sanitary purity, for general nutrition to be re-established upon a firm foundation, and for the previously unstable nervous system to be so steadied and invigorated that it will be enabled to resist such disturbing influences as once proceeded from

the contact of atmospheric irritants with the hyperæsthetic nasal mucosa.

May I add a concluding reflection concerning the administration of drugs to these neurotic individuals? I am perfectly capable of realizing that there may be certain conditions or emergencies in which it is temporarily justified, but it has long been my belief that the sooner and the more these people are made to depend upon themselves, the better. In other words, I am confident that they can present scarcely a condition,—be it anæmia or plethora, loss of appetite or failure of digestion, constipation or other eliminative defect, insomnia, irritability of temper or mild melancholia,—that will not be more quickly and completely overcome by a judicious combination of diet, bathing and exercise, than by any combination of drugs, however artistic it may be. Drug reliance is almost certainly destructive of self-reliance, and to the neuropath that is fatal. I only allude incidentally to the extravagant claims that are made for every newly introduced method of treatment, to regret that men of any authority should make them. When we are told of and asked to believe in the large percentages of *cures* (!) that have been effected by irrigation of the accessory nasal sinuses, by some trivial medication addressed to the composition of the saliva, or by the cauterization of a number of specially sensitive areas within the nose—concerning the location of which there is little agreement between different observers—the judicious among us are apt to grieve and the irreverent to smile.

Finally, I need scarcely point out to you who practice general medicine that the prophylaxis of these distressing nasal affections lies almost entirely in your hands. If the children hereditarily predisposed to them were reared with an eye more to their physique than to their mentality, if the health and vigor of their mucous membranes were carefully guarded, if they were relieved of their adenoids and enlarged and catarrhal tonsils early in life, if their simple and infective coryzas were by these means lessened in number, violence and duration, and if, finally, we secured the normal development of the nose by having the orthodontist keep a close and competent watch upon the development of the upper jaw, there would be, I am quite confident, very few of these children who would suffer later in life from any of the nasal neuroses.

Dermatology

SPOROTRICHOSIS

BY DRS. DUVAL AND VINARD
of Paris

THE first case of this disease was reported by Schenk in 1898. Although in the beginning it was considered to be very rare, it has since been found to be relatively common, as more than twenty cases have been published in Paris since de Beurmann and Ramond reported the first French case in 1903.

Sporotrichosis is a chronic inflammation caused by a fungus of the order Hyphomycetes, the character of whose cultures has now been well elucidated. In its clinical and anatomical features it resembles other mycoses previously known (actinomycosis, blastomycosis, aspergillosis); but its similarity with tuberculosis and syphilis is so great that the diagnosis between these different complaints is often not an easy matter. Wishing to consider the question from an essentially practical point of view we will give particular attention to the clinical character of the disease, and will only refer to laboratory research in so far as it will be of help in arriving at an exact diagnosis.

The pathogenic agent is a sporotrichon, which in its natural state is found on a number of plants and in particular on the beech tree; it has been cultivated on gourds, rice and beans, and has been found on salad, on which vegetable it can be cultivated, as well as on other vegetables.

It is probable that human infection takes place through the intermediation of the vegetables that bear the parasite; for in a number of cases it has been noted that the patients were housekeepers, waiters, cooks or laborers in the markets.

The means of access is in certain cases clearly by the skin, infection following some accidental wound; in other cases it has

appeared likely that inoculation arises from the digestive tract, and the probability of this source has been strengthened by experimentation on animals.

Certain general conditions (tuberculosis, syphilis, cirrhosis of the liver, gout and pregnancy) have been noted in patients suffering from sporotrichosis; but others, on the contrary, showed no cause of diminished vitality.

A. The lesions so far known to be due to sporotrichosis are as a general thing *cutaneous*, though this is not always the case. De Beurmann and Gougerot, guided by the analogy existing between the skin manifestations of sporotrichosis and those of tuberculosis, syphilis and even of echthyma, describe forms of the disease bearing these names. There can be no doubt about the similarity between the appearances of these disorders; but since sporotrichosis is a specific disease, due to a well-defined parasite, its lesions deserve to be described in themselves, apart from the terminology of other complaints. For this reason it seems best to take the anatomical seat of the lesion as a basis of a classification of its forms.

1. *Hypodermic Form*.—This includes two varieties, differing from each other by their dimensions, the hypodermic, nodular form, and the large, subcutaneous abscess.

a. *Hypodermic Nodular Form*.—The number of elements varies greatly; never less than three, there are often twenty or even more, and their dimensions also are very variable. Buried sometimes in the skin, where they can only be detected by careful palpation, at others they are large enough to modify the outline of the region and to attain the dimensions of a walnut or a mandarin orange.

The limits of the nodules are not always precise but extend more or less into the neighboring tissues. Their consistency, which is at first hard, becomes softer later on, and in the centre of the diffuse infiltration fluctuation finally appears and extends little by little to the entire mass; the result of the process is a hypodermic abscess, over which the skin is at first healthy; it is only after the lapse of a certain length of time, two or three months, or more, that the tegument reddens, becomes thin, and finally opens to let out the pus. This evolution towards suppuration and spontaneous evacuation is by no means obligatory; among the cases reported there have been some in which the different abscesses on a given patient showed no

tendency towards spontaneous evacuation, and even in which certain nodules did not break down.

This difference in evolution appears to depend on the abundance of the parasite in the pus—when there is tendency to ulceration the lesion is usually rich in parasites.

During their entire evolution the foci of sporotrichosis only give rise to physical signs; they do not produce, either spontaneously or during clinical exploration, the slightest degree of pain. The most that has been observed is a small amount of functional inconvenience due to the position of the nodule.

The elements, whose general characters we have just described, show in their topographical distribution two distinct forms: they may either be spread here and there at random beneath the different portions of the skin (thus one patient showed five, viz., on the right forearm, right arm, abdomen, right instep, left hip), or the abscesses may be distributed along the course of the lymphatics (thus another patient showed on the left arm seventeen nodules extending from the back of the hand along the radial aspect of the forearm, elbow, and inner aspect of the arm). Consequently, the distribution in this case was practically that of the lymphatics. In certain instances there is as well a marked degree of lymphangitis, and the abscesses extending along the limb are connected by irregular knotty trunks. Two varieties should be distinguished in the lymphatic form: one in which nodules clinically independent of each other simply extend along the anatomical course of the lymphatics; another in which lymphangitis is clinically evident from the enlargement of the lymphatics themselves.

A remarkable feature in these cases where the lymphatic system is manifestly infected is that in both the lymphatic and disseminated forms, the lymph-nodes are not modified to any appreciable degree.

b. The Large Abscess Form.—Here we have only one case. The patient showed twenty or more abscesses on various parts of the body. Their slow evolution resembled that of chronic tubercular abscesses; their volume was considerable, some of them containing as much as 400 grammes of pus.

2. Primitive Dermic Form.—This variety coincides frequently with the hypodermic form of the disease. It is characterized by the appearance of nodules in the dermis, particularly in regions where

the skin is delicate, such as the face and inner aspect of the arms. The elements, which are more or less rounded, vary in dimensions from a pea to a franc piece. They run together in red and lumpy patches that secrete slightly, and this state lasts for a long time; it is only after several weeks that the patch softens at certain points and finally ulcerates, giving rise to irregular losses of substance with a secreting, yellowish base. When these lesions heal up, either spontaneously or under appropriate treatment, they leave a scar, which is either depressed, shiny and smooth, or on the contrary of keloid appearance. The lesions are consequently very similar to ordinary tubercular lupus. In some cases the dermic nodules become redundant and take the form of tuberculosis verrucosa.

3. *Ulcerating Sporotrichosis*.—Although ulceration sometimes follows spontaneous opening of these abscesses, it is generally produced by surgical intervention. Some ulcerations that we have seen were as large as a five-franc piece. Their edges were irregular, thickened, detached and purple, the irregular cavity gave issue to viscous serum that thickened into grayish-yellow scabs. These sluggish ulcers, without tendency to spontaneous repair, give rise to no special pain, except on the occasion of accidental traumatism.

4. *Epidermic Localization*.—This form occurs especially in patients suffering from open lesions, and is undoubtedly due to auto-inoculation of the surface. It is either entirely superficial, affects the outer layers only, and gives rise to a slight desquamation in the form of dust; or, somewhat deeper, in which case it produces vesiculation of Malpighi's corpus mucosum. The vesicles are often grouped in rings, or in segments of rings, that spread from a centre; so that the lesion is quite comparable to a patch of cutaneous trichophyton.

B. *Localizations on the Mucous Membranes*.—One case of this variety was observed in a patient with chronic ulceration of the tonsil, which was looked upon as the point of entrance of the disease; another one concerned a case of papillomatous laryngitis, of which the sporotrichotic nature was duly demonstrated.

C. *Localizations in Non-cutaneous Tissues*.—Up to the present time these appear to be much less frequent than cutaneous lesions. Two cases have been reported of intramuscular sporotrichosis. A laryngeal case was mentioned just above. One of the writers ob-

tained abundant cultures of the parasite from the sputum of a patient suffering from cutaneous sporotrichosis; but as the man was at the same time consumptive it is legitimate to infer that there was combined infection, such as occurs in aspergillosis. Finally, quite recently, in a case that has not yet been published, laboratory research showed that an attack of pyelonephritis during pregnancy was due to sporotrichotic infection.

As regards diagnosis, in clinical medicine the almost simultaneous appearance of painless hypodermic nodules irregularly disseminated or placed along the course of the lymphatics, some closed and others broken down or fluctuating, ought to awaken the idea of sporotrichosis. The probability of the mycotic nature of the lesions is increased by the apparent contradiction observed between the disorder of the lymphatics and the absence of enlarged lymph-nodes.

Differential diagnosis should be discussed for each of the forms of the disease. To speak only of the commonest one, the nodular hypodermic variety, it must first be separated from tuberculosis and syphilis; and the fact that a patient is already known to be either tubercular or syphilitic is not an argument against the possibility of sporotrichosis. Tubercular gummata are generally less disseminated, and are accompanied by lymph-nodes; once open they secrete a dirty pus, and the ulceration has thin, free edges, and not edges that are thickened or granulating. In cases of large abscess, those due to sporotrichosis, contrarily to those due to Koch's bacillus, do not depend on a neighboring lesion of bone or joint. Syphilitic gummata occur in well-known regions, and when open secrete thick and yellow serum; they are often associated with bony lesions, and mercurial treatment has rapid effect on them. With infants, chronic subcutaneous abscesses can be occasioned by the ordinary saprophytes of the skin, such as the staphylococcus; they occur generally in weak, badly-nourished or tubercular cases, and are observed usually on the hips and shoulders,—that is to say, at points that bear the weight of the body. As for the dermic lesions, they may simulate various forms of cutaneous tuberculosis, and also certain varieties of syphilids; their coexistence with a number of subcutaneous lesions makes it allowable, beside the minute analysis of their special characters, to think of the possibility of sporotrichosis.

A diagnosis of sporotrichosis can be asserted clinically in certain cases; in others it can only be looked upon as probable, and in

all it should be confirmed by laboratory research methods, among which the demonstration of the presence of the parasite necessarily carries conviction. Histological examination enables a positive diagnosis to be given in some cases; the experimental study of sporotrichosis has so far remained more a matter of scientific than of practical interest. We will therefore lay greater stress on microbiological research, and will only give a rapid view of the histological lesions of sporotrichosis in man, and of the experimental results obtained in animals.

Microbiological Research.—This is the most readily carried out by using the pus from a closed sporotrichotic abscess. The pus of such an abscess is yellowish or grayish-yellow, usually fairly thick, always viscous, and difficult to aspirate; for this reason it is necessary in extracting the pus to use an instrument of a fairly large calibre.

On examining extemporaneously such pus spread on a slide, fixed and colored, it is difficult to detect the pathogenic agent, which is habitually present in extremely small numbers, and takes the dyes badly. It is a small, ovoid element, more colored at the ends than in the middle, and shaped like a shuttle. It is rare in man to find them abundant, voluminous, fusiform and well colored; in cats, on the contrary, in experimental sporotrichosis, this is the appearance that they present.

When an extemporaneous search for the sporotrichon in pus spread on slides remains negative, we are not warranted in rejecting the hypothesis of sporotrichosis; for pus that contains no microbial element revealed by simple coloration, nor any Koch's bacilli detected by Ziehl's method, has a chance nevertheless of being sporotrichotic pus, especially if the polynuclears that it contains are not much altered, and if there are a large number of vacuolar, epithelioid cells in macrophagic activity.

Pus kept at the ordinary laboratory temperature in a sterilized tube closed with wool, and not with india rubber, does not throw down a sediment, but remains homogeneous and non-transparent; whereas tubercular pus under similar conditions quickly shows an abundant deposit, with clear fluid above it.

At the end of a few weeks there are seen in sporotrichotic pus small yellowish clumps regularly rounded; these are colonies of sporotrichon formed of mycelium filaments with short segments

resembling yeast chains. At the end of several months the sporotrichon colonies that have thus developed spontaneously still retain their vitality, and when transplanted on appropriate media give all the differential characters necessary for the identification of the parasite. Even when, then, no immediate microbiological research is made, the proof of sporotrichosis can be furnished at a very remote period, if by chance some pus has been preserved.

The sporotrichon grows on all the ordinary media, but it acquires its most marked differential characters on agar treated with maltose. Sporotrichotic pus is often very poor in parasitic elements, and must therefore be spread in a broad band on the surface of the agar. Several drops of pus may sometimes give only two or three colonies, though in a few cases they can supply fifty or more. The tubes when prepared must not be closed with india rubber, and must be kept at the ordinary temperature of the laboratory, as the heat of the oven sometimes prevents germination. The colonies begin to appear, on an average, at the end of a week. They form small, round, raised spots, white at first, but soon become black in the centre; they spread rapidly, particularly if they are not very numerous. Their raised centre becomes blackish, while their edge spreads in a white line that sometimes has a brown border. Under the microscope the cultures are found to consist of a very fine lot of mycelium containing in its protoplasm drops of fat and provided with lateral and terminal conidia.

Pathological Anatomy.—A sporotrichotic abscess has a thick wall in which again are smaller abscesses of unequal size, of which some are even microscopical. The cavity of the regular abscess is irregular and anfractuons. The inflammatory tissue forming the wall of the abscess is of a pinkish-yellow tint which dies away imperceptibly into the surrounding tissues. Histological examination of this wall shows inflammation, with preponderating connective-tissue elements. The connective-tissue cells are hypertrophied, and their basophilic protoplasm is very extensive. Many become phagocytes, while others are stricken with erythrophile degeneration and change into giant cells or into epithelioid elements. The vessels, which are increased in number and size, are inflamed. In addition to the connective-tissue modifications there is an increase in polynuclears and mononuclears. The polynuclears, especially the neutrophiles, are scattered throughout the meshes of the

swollen connective tissue or grouped in little miliary abscesses. The mononuclears are mainly lymphocytes, among which many change to plasma cells and constitute extensive plasmomata, some changing to eosinophiles. From the simultaneous pressure of all these elements results an extremely composite histological appearance which is sufficient in itself to lead to a diagnosis of sporotrichosis.

Experimental Research.—Among all the animals tested the mouse appears to be the best reagent. With this animal generalization to the viscera is of frequent occurrence. The rat is less susceptible. Inoculation of human lesions to the guinea-pig is negative, and this fact is interesting, as it proves that the lesion is not a tubercular one. The rabbit develops nodules containing thick, caseous pus; visceral generalization is rare with this animal. Inoculation beneath the skin of a cat is followed either by ulceration and surface auto-inoculation, or by a closed hypodermic abscess, which may remain the only lesion until the animal dies, or may be accompanied by the formation of other subcutaneous abscesses unconnected with the primitive lesion. Intraperitoneal inoculation always gives rise to bilateral, suppurative orchivaginitis. With monkeys there are disseminated subcutaneous lesions.

Prognosis and Treatment.—Sporotrichosis is a disorder that chiefly affects the skin, and its gravity does not appear to be very great; still, the extensive lesions that it is capable of producing, the slowness with which these lesions heal up when left to themselves, and the sometimes unsightly scars that follow, make it desirable that an accurate diagnosis should be made.

We have at our disposal a remarkably efficacious treatment: two or three grammes per diem of iodide of potash in solution. In three or four weeks the lesions retrograde, the gummata are absorbed, and usually disappear entirely in two or three months. In order to avoid relapse it is prudent after apparent recovery to continue the treatment for several weeks longer. It is not advisable to open the abscesses, as after such intervention the edges of the wound may become inoculated and new abscesses form.

When it is found that the contents of an abscess resist the action of the internal treatment, the pus should be aspirated. Finally, to ulcerations and superficial dermic lesions it is advisable to apply dressings soaked in a solution of Gram or Lugol.

Pathology

ABSORPTION FROM THE PERITONEAL CAVITY

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THE study of absorption from the peritoneal cavity, while presenting many points of theoretical interest in connection with the subject of absorption in general and the movements of fluids and solid particles within the body, is of especial practical importance in its relation to peritonitis and to the distribution of infective materials, which may gain access to the peritoneum in so many ways.

In this study we find ourselves concerned with the effects of osmosis and diffusion with respect to the soluble substances, and with the most complicated mechanical processes and evidences of the vital activities of cells when we consider the fate of solid particles and bacteria. The whole series of phenomena which comes at once into play if we introduce any foreign substance into the peritoneal cavity is an extremely complicated one, and even yet there is not universal agreement upon all points.

Even as to the anatomy of the peritoneum our ideas have as yet hardly crystallized into definite form, and the doctrines accepted for years as the satisfactory and easy explanation of many of these phenomena have been attacked and destroyed within the last few years. Such a doctrine was that of von Recklinghausen, who described large open stomata in the diaphragmatic peritoneum, opening into the lymphatics there, in so graphic a way that many others followed him and described and accepted them too. Although it seems fairly well agreed now, that there are no stomata in the mammalian peritoneum, there are many other points which are by no means so clear, and we have even yet no satisfactory description of the minuter characters of the lymphatics in all the recesses of the

peritoneal cavity, and of their relation to the cavity itself. It may be well to give at this point a brief review of those peculiarities of the peritoneum which are important in relation to the subject under discussion.

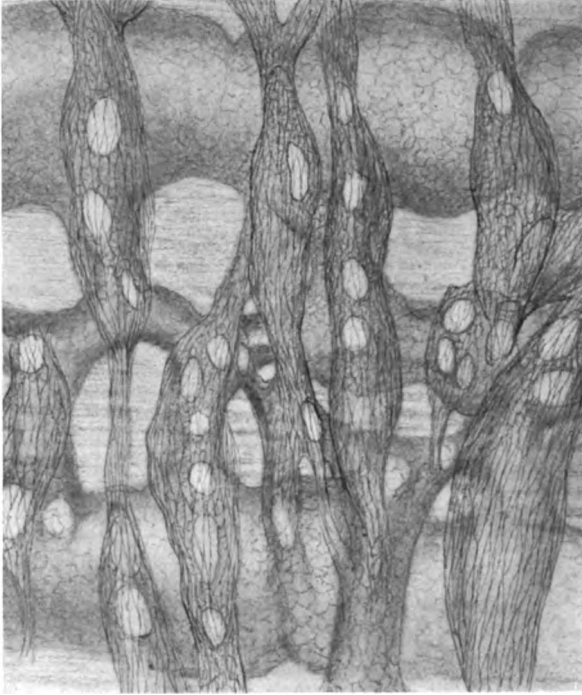
First of all the peritoneum is lined by a uniform layer of cells, rather flattened in shape, although capable of swelling into a low, cubical form, which we call *epithelial cells* for various reasons, although they have long been designated endothelial cells by many writers. These cells have a cell-body containing the nucleus, which is slightly smaller than the perfectly transparent superficial plate of protoplasm. From this it results that while the superficial plate meets that of the neighboring cell, there is usually a minute space between the cell-bodies. This, as well as the fact that the free surface of these cells is usually finely ciliated, we owe to the work of Kolossow.¹ The peritoneal lining cells are not perfectly uniform in size or shape, but they form a complete lining and are accurately opposed to one another, although it is true that this cement line is somewhat yielding, and other cells or even foreign particles sometimes force their way through it and between the epithelial cells. They stand on a delicate, structureless, limiting membrane, which is in some places fenestrated. Underneath them on the peritoneal connective tissue run the blood-vessels and lymphatics. The vascular supply is very rich, but in some places not nearly so rich as that of the lymphatic vessels.

With regard to the distribution and character of these two types of vessels, we must consider the parietal peritoneum, that of the diaphragm and various fossæ, including the pelvis, that of the mesentery and the abdominal organs, and the omentum. Attention has been directed almost exclusively in studies upon this point to the diaphragm, which has been tacitly assumed to be the only area in which any peculiar arrangement of the lymphatics is to be found. Even in the recent monographs and text-books, such as that of Poirier and Cuneo,² and Poirier and Charpy,³ I can find no description of the arrangement of the lymphatics in other remote parts of the peritoneum. This is the more surprising, since such confident advice is given by surgeons as to the most advantageous posture of their patients to insure or prevent rapid absorption from the peritoneum.

With regard to the diaphragm, I may be permitted to quote the description in a previous paper.⁴ "The pleural surfaces of the diaphragm may be readily distinguished from the peritoneal by various anatomical peculiarities, a few of which will interest us. It is found that the connective-tissue bundles which show through the transparent superficial tissue lie in general parallel with one another. Large blood-vessels and nerves course through this tissue and the lymphatic trunks can frequently be seen as clear canals, branching about over the surface. When injected they are found to have a characteristic arrangement, which, however, need not be described here except in its merest outlines: There are lateral semicircular canals, coursing along with the lateral veins near the line where the musculature passes over into the tendinous centre. From these, efferent trunks pass forward to the anterior mediastinum, where they accompany the mammary veins, while others run backward to the point where the vena cava, cesophagus, and aorta penetrate the diaphragm, and accompanying these structures, pass through also to empty into the abdominal lymphatic trunks.

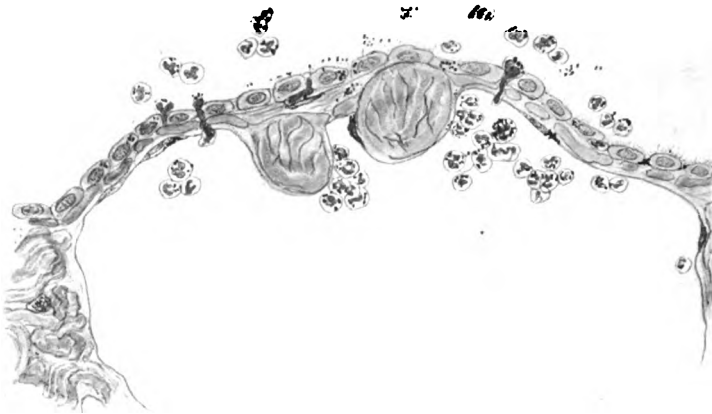
"Extending in all directions from these main trunks on the pleural surface are branching channels with the characteristic segmentation and provided with the curious, long, filmy valves at each segment, which flutter like flags in the stream and have a line of closure a long way from the actual edge. These channels anastomose abundantly and form a network over the whole surface. Passing through the musculature of the diaphragm, from this network, are short trunks which communicate with the layer of lymphatics lying on the peritoneal side. The tissues here are rather differently arranged—the muscle bundles run for the most part parallel with one another and radially, being separated by connective tissue in which lie the parallel and likewise radially placed lymphatic canals which receive the communicating channels from the pleural side. These canals are somewhat beaded or bulged along their course, but it could not be determined that they are provided with valves. They project a little above the muscle into the overlying connective tissue on the peritoneal side. The bundles of this connective-tissue layer are in general parallel with one another, but diverge here and there to leave lozenge-shaped spaces, which are readily visible to the naked eye in the dog and in man often measure 2–3 mm. in length

FIG. 1.



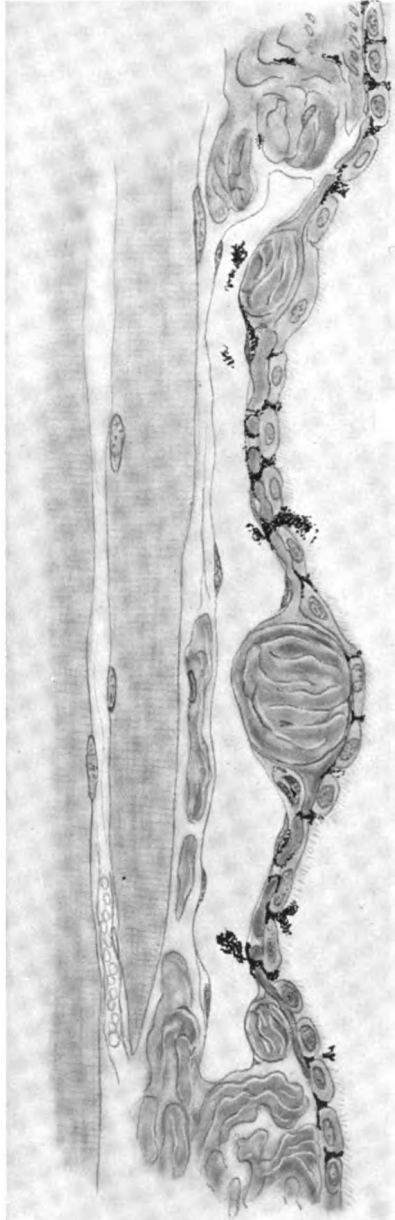
Diaphragm of dog in which the lymphatics have been injected with silver nitrate. The lacunae are intended to appear as arching anastomoses between the radial trunks which lie at a lower level and to communicate with them freely by wide openings.

FIG. 2.



Roof of a lacuna in section showing the entry of pigment by the aid of phagocytic leucocytes.
Epithelial and endothelial cells are also phagocytic.

FIG. 3.



Roof of a lacuna in section showing entry of free pigment between the cells. Cross-sections of the lattice work of fibres are seen in the roof of the lacuna.

and 1 mm. in width. The connective-tissue bundles and therefore also these spaces run in a direction transversely or obliquely across the radially arranged muscle-fibres.

"Now the parallel lymphatic canals are most abundantly connected by anastomosing channels which run obliquely or transversely across the intervening muscle-bundles and lie generally nearer the peritoneum than the radial trunks themselves. Often some of these, running obliquely, join in the middle between two of the radial trunks to form a sort of secondary radial trunk which lies upon the surface of these muscle-bundles. Others arch up toward the peritoneum in their course from one radial trunk to another. These are sometimes relatively simple fusiform tubes, while at other times they branch and interanastomose with one another in a complicated way, often forming secondary connections with other parts of the trunks by means of very narrow canals. In general all of these anastomosing channels open into the radial trunks by exceedingly wide and numerous openings, so that there is the freest possible intercommunication. In their arching course they come to lie in the spaces between the connective-tissue fibres of the layer overlying the muscle—that is, in those lozenge-shaped spaces which are described above—and here they are separated from the peritoneal cavity by an extraordinarily thin layer of tissue only. This somewhat complicated arrangement is perhaps best described by the drawing, which shows the extremely rich network of vessels (Fig. 1).

"It will be seen that these form the most favorable situations for the entrance of materials from the peritoneum, and undoubtedly they are especially adapted to that purpose. These sac-like channels are easily seen with the naked eye, even without being injected or distended. They appear as small, diamond-shaped or fusiform, clear areas, generally a little sunken below the surrounding tissue, but when distended they are elevated above the surroundings as tiny vesicles. In the diaphragm of man and the dog the covering of transparent tissue is easily seen. In the ox's diaphragm, however, they look like mere holes or depressions on the surface, and it is only by picking up the membranous roof with the forceps out of the depth of the depression, that we see the real nature of the structure. In the rabbit they are elongated and radially placed—especially developed in the centrum tendinosum, where they lie between the radial

fibres. In dogs and men, however, they seem more abundant over the musculature of the diaphragm.

"Now when granular material is injected into the peritoneal cavity we find on examination of the diaphragm after a time that these superficial anastomoses or blind sacs, or, as we for brevity call them, *lacunæ*, are injected with the granular substance; and from them we can trace the material into the anastomosing trunks of the pleural network, into the efferent trunks, and then very readily into the mediastinal lymph-glands. It is interesting to note that even when actual entrance of the pigment into the *lacunæ* has not occurred, the deposits of pigment are almost exclusively upon their roofs, possibly because in their collapsed condition these lie somewhat below the surrounding level. The roofs of these *lacunæ* must, therefore, be of especial interest to us in determining the mechanism of the absorption.

"It is found that while they lie between the connective-tissue bundles, and are thus situated obliquely or transversely over the muscle, they are themselves traversed by other finer fibrils, which cross them obliquely or transversely and which consist, no doubt, merely of diverging superficial fibres of the main layer. When, therefore, one looks down upon one of the *lacunæ* in its distended condition one sees these fibrils cross its bulging surface like ropes across a full sail. Elastic fibres are present in numbers, often forming definite layers throughout the superficial connective tissue of the diaphragm, and they too, often stretch across the roofs of the *lacunæ*."

Details of the structure of these *lacunæ* may be found in the paper referred to; but here it may be briefly stated that they are completely lined by a single layer of flat endothelial cells, closely joined to one another edge to edge, with no semblance of a stoma or preformed opening, and are separated from the peritoneal cavity by little more than the fenestrated membrane with the closely set peritoneal epithelial cells, among which too, no gaps are to be found. They are, therefore, lymphatic sacs admirably arranged by their position for the ready absorption of materials from the peritoneum. Of the other parts of the peritoneum, it may be said that there seem to be no such protruding sacs from the lymphatics. On the contrary the lymphatic network is composed of small vessels richly anastomosing with one another to form a fine network, which lies

somewhat more deeply and which has not the appearance of being especially adapted to absorption from the peritoneum. This is probably true of the whole parietal peritoneum lining the abdominal wall. It seems to be true also of the covering of the intestines and other organs and of the mesentery. As to the arrangement in the omentum it is difficult to speak with certainty. Buxton and Torrey⁵ were unable to recognize lymphatics there, and I have also failed to find them, although this is doubtless only because of the difficulty in injecting such a tissue.

The pelvis is supposed by surgeons to be a position in which absorption is especially slow, and into which it would therefore be well to turn as much as possible of the infected peritoneal exudate. A search for a careful description of the lymphatics there, has, however, been quite unsuccessful; but injections made for the purpose of gaining some light upon this point have given us some rather surprising results, which may be mentioned here although their detailed description must be deferred. It is found that in the male pelvis there are areas in the deepest portion of the pelvis between the rectum and the bladder which in their general arrangement of fibres resemble the peritoneal surface of the diaphragm. There are the same diamond-shaped spaces between the interlacing fibres covered by thin, transparent peritoneum, which make such an area very different in appearance from the perfectly smooth, uniform surface of the general peritoneum. Careful injections show that the lymphatics there are not exactly comparable to those in the diaphragm, but that there are large, thin-walled, very superficial sacs, which are extremely irregular in form and often intercalated in a rich network of swollen, irregular channels sometimes so wide as to leave only small spaces unoccupied by the channels. Although perfectly sharply outlined, these channels are sometimes so irregular in form that they can hardly be called channels, but rather lacunæ. In other places in these same areas injection brings to light dense arrangements of parallel lymphatic twigs giving almost the appearance of a gridiron and so superficially arranged as to suggest at once their possible function in absorbing from the peritoneum. As soon as one leaves the areas described and passes up over the bladder or the rectum or to the sides of the pelvis, the lymphatic network becomes deeper and resumes the character seen in the abdominal walls. In the female this is the type which is found all over the

bladder and the body of the uterus and over the rectum. On the posterior surface of the broad ligament on each side there is, however, a patch—often called by gynecologists the *clear space*—in which the lymphatics appear to have the absorbent character described above. Much more study is necessary before these networks can be accurately described, but they appear to have some practical importance in connection with the subject under discussion. Such then is our rather meagre knowledge of the tissues with which absorption from the peritoneum is carried on.

If now we turn our attention to the absorption of soluble materials we find that numerous experiments have been carried out with the aim of determining the rapidity and extent to which such absorption takes place, and the paths by which these materials are carried away. Various substances have been used; but preference has been accorded to those which are readily recognizable by their color or chemical reaction, and especially to those which can be estimated quantitatively in the urine or wherever else they are searched for. Such substances are indigocarmine, potassium iodide, lactose, etc. Studies have also been made with salt solution and serum, the changes in which can be recognized by comparison with the fluid remaining in the peritoneum; and finally absorption has been estimated by the appearance of toxic symptoms after the injection into the peritoneum of such poisons as strychnine.

Starling with his associates⁶ has shown that colored fluids are absorbed rapidly by the blood-vessels and that they appear in the urine before the lymph of the thoracic duct is colored. The ligation of the thoracic duct appears to have very little effect upon the rate of such absorption, and they even suggest that the coloration of the lymph which does appear may be secondarily derived from the blood. These results have been substantiated by Mendel,⁷ in spite of the contradictory outcome of the work of Adler and Meltzer,⁸ who emphasize the importance of the tissue-spaces intervening between the peritoneum and the blood-vessels and intimately related to the lymphatic vessels. These two authors support their contention by their observations upon the retardation of the poisonous effect of strychnine when the thoracic duct is tied, and hold the view that substances are absorbed first into the lymphatics, which empty their lymph then into the blood stream. It has been pointed out, however, that their method of collecting the urine from the

bladder may be responsible for the delay in the appearance of the test material in the urine, and it is almost universally agreed that the weight of evidence is in favor of the ideas of Starling and Mendel. Clairmont and Haberer,⁹ however, found a retardation in the absorption of potassium iodide and of strychnine when they covered the diaphragm with a layer of collodion; and Freytag¹⁰ has demonstrated a marked difference in the absorption of lactose and of potassium iodide, so that there is not yet absolute agreement upon this subject.

Much has been done with respect to the absorption of solutions of different degrees of concentration; and there has arisen a discussion as to whether this process may be explained entirely upon the basis of physical laws or only by invoking the somewhat mysterious vital activities of the living cells. Heidenhain¹¹ and his pupil Orlow¹² take this latter view, basing their opinion upon the observation that salt is absorbed even when a solution so dilute as 0.4 per cent. is introduced into the peritoneum, although the concentration of the blood-plasma with respect to salt is nearer 0.7 per cent. Orlow's experiments showed that salt is secreted from the tissues into the peritoneum when the concentration of the introduced solution falls to 0.3 per cent. but not so when it is not less than .4 per cent. These authors claim further that the introduction of such a cell poison as sodium fluoride with the salt solution retards the absorption greatly because it kills the cells and obliterates their vital resorbing activity. Leathes and Starling¹³ used a solution of fluoride five times as strong, however, and still observed no slowing of absorption, so that they conclude that the whole process is explicable on physical laws. These views are shared by Hamburger,¹⁴ Roth,¹⁵ and others, who point out that on the injection of any solution into the peritoneum, changes immediately began to occur which, if time be given, reduce the solution to a condition of isotonicity with the surrounding fluids of the body. This establishment of equilibrium becomes more and more complicated with the increase in the number of substances contained in the fluid injected. Water passes into the blood from hypotonic solutions, but emerges from the blood into hypertonic solutions, responding in this way to the total molecular concentration of the two fluids concerned. The partial concentrations also equalize themselves, so that, as Orlow points out, salt is furnished from the blood when

one injects a 0.3 per cent. solution into the peritoneum. Roth emphasizes the importance of proteins in this respect in initiating the exudation of fluid from the blood and in turn entering the tissues themselves.

Much of the discussion as to the absorption of salts from the peritoneum has hinged on the observed fact that even from a hypotonic solution the salt may pass into the circulation, which has been brought forward by Orlow as evidence of the vital selective action of the peritoneal cells—for example, he found that salt was absorbed after three hours from a solution of 0.4 per cent., whereas the body tissues have a concentration of about 0.7 per cent. On the other hand at the end of three hours he found that salt had been exuded into a solution of lower concentration, 0.3 per cent. It seems possible, however, that the fact that he made his observation at the fixed time of three hours after injection may be responsible for these results, since in that space of time the establishment of equilibrium might be completed in the case of a 0.4 per cent. solution, but might be still in progress in the case of the weaker solution. If his observations had been made earlier in the case of the 0.4 per cent. solution or later in the case of the 0.3 per cent. solution the results would doubtless have been different. This is especially suggested by the fact that Orlow found that the concentration of the fluid left in the peritoneum in all cases approaches that of the blood.

All are agreed, however, that if time be given there is finally established a complete equilibrium between the tissue fluids and that in the peritoneum, in the course of which the blood receives and parts with various substances. As to the mechanism of the absorption of this perfectly isotonic solution which remains, there is still some question; but it is generally stated that peristaltic movements, abdominal pressure, etc., finally aid in its complete disappearance. Orlow and many others point out the fact that in this absorption the flow of lymph from the thoracic duct is not appreciably increased, nor is there marked diuresis. The question of diuresis is, however, not merely a function of the amount of fluid introduced, but rather of the renal activity, and need not be discussed here.

The effect of various poisonous and otherwise injurious agents on the absorption appears to be different in the hands of different observers, and there is as yet no unanimity of opinion on this point.

Consequently there remain for the time differences of opinion as to whether the process is a purely physical one or to some degree analogous to the processes of secretion in the cells of a gland.

The effect of circulatory changes in the peritoneum is also somewhat difficult to decide from the varying results obtained. Everyone agrees that hyperæmia of an active kind will cause a more rapid absorption, and Klapp¹⁶ has especially experimented with the effect of heat applied to the abdomen. He found that the application of moderate heat increased the circulation of blood and accelerated the absorption, although excessive heat tended to retard it. Chilling of the abdomen retards and limits the circulation and consequently absorption is also limited.

Inflammation, which is of course associated with an acceleration and amplification of the circulation, is found to accelerate absorption; and this fact, which has been experimentally proven by Klapp, Glimm,¹⁷ Clairmont and Haberer, and others is not invalidated by the result obtained by Clairmont and Haberer in animals, in which they produced a most intense inflammation with croton oil, in which case absorption was slowed. The condition of the animal and the state of its general circulation has doubtless much to do with this, and we should expect a retardation of absorption in an animal dying of peritonitis. The conditions in the late stages have thus been differently estimated by different writers.

With regard to the effect of mechanical disturbance of the circulation, Klapp and Clairmont and Haberer have written—Klapp finds that slight handling of the intestines in a laparotomy may accelerate the absorption by intensifying the circulation, but that prolonged handling and exposure causes a venous hyperæmia which distinctly interferes with absorption. Clairmont and Haberer on the other hand find that any laparotomy—even the slightest—tends to retard absorption and that this retardation only increases with the amount of handling and exposure of the intestines. Dry exposure, such as occurs in a laparotomy in which the surfaces are wiped with dry sponges, causes great retardation of absorption, while this is very much less marked if the intestines are kept moistened with warm salt solution.

Finally, it is found that the activity of peristalsis has a great effect in increasing the rapidity of absorption, and that its paralysis by opium is followed by the reverse effect.

When we turn our attention to the fate of insoluble substances in the peritoneum, we find a whole series of mechanisms of a quite different character arranged to remove such particles to some other part of the body where they may be destroyed or lodged with less disturbance to the functions of the organism. Only very small particles can thus be removed; larger fragments are attacked by phagocytic cells which tend to disintegrate them, or failing this they are finally encased in fibrous tissue and remain encapsulated in the peritoneum. Smaller particles are, however, quickly removed, as was shown by von Recklinghausen and the school of Ludwig, and find their way into the most distant tissues. Their fate there need not occupy us; and it will suffice to say that Buxton and Torrey have shown in their recent paper that such particles reach the distant organs with astounding rapidity, being found there in abundance in as short a time as ten minutes after the injection. It is generally agreed that their pathway is chiefly if not entirely by way of the lymphatics, especially through those which are so favorably disposed for peritoneal absorption in the abdominal surface of the diaphragm. For a detailed description of the minute structure of these lymphatic lacunæ and of the entrance of foreign granules into them, the paper previously mentioned may be referred to.¹⁸ It is there shown that these lacunæ, connected as they are with lymphatic trunks which give off perforating branches to the collecting trunks on the pleural side, are separated from the peritoneum only by a thin, fenestrated membrane and the peritoneal lining cells. Into them there pass the granules injected into the peritoneum in such numbers as to produce something resembling an artificial injection. The granules pass through in the free state or are carried through by phagocytic mobile cells which have engulfed them, and in either case they are quite independent of any hypothetical stomata, for the epithelial and endothelial cells which form the only barrier are joined together so loosely that the pumping action of the diaphragm in respiration is sufficient to facilitate their passage. If such a diaphragm be quickly washed during the passage of the particles the pigment is found to adhere over the lymphatics, and close inspection shows that each cell is outlined by particles in the act of forcing their way between the cells. This is independent of any vital activity of the cells, for if artificial

respiration be maintained the granules will enter the lacunæ even in animals long dead or in those in which the cells of the diaphragm have been killed by some poison. Loaded phagocytes push their way between the cells in just the same way (Figs. 2 and 3). When once in the lymphatics the particles are carried to the retrosternal lymph-glands or backward to the retroperitoneal group. Doubtless this process is aided too by active peristalsis and by other movements which bring substances into contact with the diaphragm. To what extent absorption of particles is carried on in other regions of the peritoneum can hardly be clearly deduced from our scanty knowledge of the anatomical conditions, and no one seems to have studied the matter with special care. It is true that no such injection of the lymphatics as is produced in the diaphragm by introducing colored particles into the peritoneum is found in the walls of the abdomen or in the peritoneum covering the abdominal organs and mesentery. As to the conditions in the pelvis, I can find no satisfactory observations, but it is frequently observed that tubercles develop in the pelvis, as do the implantations in cases in which cells from a carcinoma are distributed in the peritoneum. From what has been said about the structure of the superficial lymphatics there, it seems probable that some absorption takes place there, although from the limited size of the absorbent area and the slightly deeper position of the lymphatic sacs in the tissue this absorption is doubtless not to be compared with that in the diaphragm as far as the amount is concerned.

With regard to the omentum Buxton and Torrey find that the lymph-glands which drain it, quickly become loaded with the particles absorbed from the peritoneum, but they could not outline the lymphatics in its substance, nor trace their course, and I have not been more successful.

Those particles, including bacteria, etc., which are not thus hurried into the absorbing lymphatics in their free state, are soon taken up by phagocytic cells of various sorts, and the paper of Buxton and Torrey is especially full and interesting with regard to this part of the process. They distinguish at least two types of cells which are engaged in phagocytosis, the polymorphonuclear neutrophile leucocytes and certain large phagocytic cells or macrophages, which are especially active in engulfing other cells and

débris. When bacteria reach the peritoneum they are quickly entangled in a network of fibrin, which is especially readily formed on the omentum, where they stick in great numbers—some free, many enclosed in the voracious macrophages. These macrophages can in time digest them, as they also digest foreign cells or other particles, but they destroy bacteria easily only when there is an abundant migration of polymorphonuclear leucocytes, which seem to aid the macrophages in destroying the organisms even if they do not themselves engulf the bacteria. These large cells, having loaded themselves with particles, push into the tissues, where they become more or less stationary, either digesting completely their contents or retaining them for a long time. Whether they enter the diaphragmatic lymphatics and reach the blood stream is not quite clear.

As has been said the study of peritoneal absorption is of particular interest in its relation to peritonitis and the possible intervention for the cure of this condition.

It has been said that in peritonitis unless the lesion is so intense as to destroy the absorbing tissue or greatly limit its functional capacity the absorption goes on rather more rapidly than in the normal peritoneum on account of the greater activity of the circulation. The great accumulation of fluid in the cavity may interfere with the circulation if it becomes sufficient in amount to stretch and compress the blood-vessels, and it is a fact known to surgeons that the relief of such tension causes the acceleration of the absorption. This was known to Wegner, who commented upon it in his paper of 1876.¹⁹ There is, however, a very high limit which must be reached before the circulation is thus impeded, and below that limit it proceeds well, possibly even aided by the intra-abdominal pressure.

Although all authors accept the statement that absorption is more rapid in fresh peritonitis, opinion is divided as to the condition in the later stages—Courmont and Haberer holding to the view that absorption is then slowed, while Glimm thinks this not true. The late stages of peritonitis must mean very different things in the minds of different men, especially since the reactions of different animals to an injury are so different. It is, therefore, not hard to understand that there should exist such differences of opinion.

In bacterial peritonitis we have to deal in the peritoneum with a mixture of bacteria and the various elements of an inflammatory exudate, and the discussion has concerned the absorption of these substances into the tissues and general circulation. Of course the most important part of the peritoneal contents, as far as this is concerned, is made up of the bacteria and their toxins, if there be any soluble toxins; but we cannot disregard the possible presence of protective substances which might also be absorbed.

The bacteria which commonly cause peritonitis are thought to do so by means of a toxin which is not diffused in soluble form from them, but escapes only when they are destroyed—an endotoxin. Therefore the injury to the body at large is probably dependent chiefly upon absorption of the bacteria, although it is easy to imagine that many of them are destroyed in the peritoneum, and the endotoxins set free there for absorption. Bacterial absorption has been very satisfactorily studied in the recent papers of Buxton and Torrey, who arrive at somewhat astonishing results from estimating the extent of the distribution of the bacteria within definite periods. They find that even with the most rapid examination of the tissues after the injection, in which a period of not more than ten minutes had elapsed since the bacteria were introduced into the peritoneum, the organs were already swarming with them. At this period there occurs a great effort toward the destruction of the bacteria, like the explosive effort which sometimes succeeds in completely destroying large numbers of bacteria in the peritoneum when they have just been introduced. If the animal succeeds in thus destroying the bacteria which are swept into the tissues it may survive; otherwise it dies of acute symptoms of intoxication resembling those of shock. If they are not completely overwhelmed by the protective powers of the animal, however, there arises a period in which the bacteria, although again almost disappearing from the organs, still exist there and in time increase in number and produce a general septicæmia. Probably the same thing is true of the peritoneum itself, in which by a great effort in some cases all the bacteria may be killed; but after the strength of this effort is spent, if any bacteria remain alive they may grow and begin afresh the invasion of the exhausted tissues.

Much effort and thought has been expended upon the study of

the rate of absorption from the peritoneum and methods for either accelerating or retarding it.

It is known, as we have said, that active hyperæmia, whether produced by heat or by inflammation, accelerates the absorption—so does peristaltic movement; while narcotics which slow peristalsis, cold, exposure, handling, and venous stasis slow it. These statements are made especially for the absorption of soluble substances, but they hold, doubtless, for insoluble particles and emulsions also. Further, it is known that the diaphragm, if not the only active absorbent surface for particles, is at least the greatest and most active; and therefore, in order to accelerate absorption in cases of peritonitis, Clark²⁰ advised the elevation of the foot of the patient's bed. Yates,²¹ in a recent study of the diffusion of foreign materials in the peritoneum from a fixed point of injection, has shown that such posture does actually allow their distribution toward the diaphragm, while the reverse posture retards such diffusion. Clark's plan was, however, not generally accepted, and surgeons have gone to the other extreme by elevating the head of the bed on the idea that infective materials would then run into the pelvis, and, on the assumption that there are no absorbent lymphatics there, would be taken into the circulation very slowly. This has been especially advocated by Fowler,²² and in his hands seems to have given good results. Further, there has been much discussion as to surgical methods of treating peritonitis and the relative merits of various efforts at drainage and different "toilettes" of the peritoneum, whether by dry or moist sponging out of the bacteria with the accompanying exudate, or by flushing out the peritoneum with isotonic salt solution. These are surgical problems rather out of our province; but it seems evident that aside from the retarding effect upon absorption, which any handling and exposure of the intestines produces, the result of such procedures would be chiefly mechanical, and the surgeon must decide as to whether by such methods he runs a risk of disseminating throughout the cavity bacteria and necrotic material which otherwise might be limited to one area and restrained in their growth by the normal protective behavior of the peritoneum. Especially important, however, is the decision as to whether he is likely by these methods to remove enough bacteria to make up for the protective substances

which he removes at the same time; and there are surgeons who limit themselves to removing the source of the bacteria, leaving the pus, which is a protective substance, to take care of the remaining bacteria.

After all, it is probable that aside from the removal of the source of the bacteria any method which the surgeon can apply must be relatively inefficient as compared with the natural mechanisms for protection which the body itself possesses. Evidently these substances produced for the annihilation of the bacteria will reach them in the peritoneum or in the tissues; and, given a certain number of bacteria no longer limited to one small area in the peritoneal cavity, it does not seem quite certain whether we want them absorbed or not. It does seem certain, however, that the methods at the disposal of the surgeon at present are not very adequate to affect this matter in either way, and the slight retardation of absorption which we can produce by any particular posture is probably insignificant as compared with the differences in the activity of the protective bactericidal substances produced by different individuals.

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Progress of Medicine

DURING THE YEAR 1908

TREATMENT

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Infectious Diseases

Typhoid Fever.—Leischman ("Berichte über den XIV Internationalen Kongressen f. Hygiene und Dermographie," ii. 536) presents a preliminary report upon the work of a commission appointed at the close of the Boer War to supply definite information concerning the prophylactic value of *antityphoid inoculation*. The vaccine consists of cultures of the typhoid bacillus in meat broth. These are sterilized when from twenty-four to forty-eight hours old at a temperature of 53° C., maintained for an hour. The sterilized cultures are preserved by the addition of lysol and are standardized by an enumeration of the number of bacteria in a given volume of the vaccine. When possible two inoculations are given, the first of 500,000,000, and the second of 1,000,000,000 bacteria, with an interval of ten days. The results of these inoculations in seven large Indian stations during the six months from January 1 to June 30, 1907, are shown in the following table:

	Mean Strength.	Cases.	Deaths.	Incidence per 1000.	Mortality per 1000.
Non-inoculated	8113	173	42	21.32	5.18
Inoculated	2207	15	3	6.80	1.36

Musehold (*ibid.*) reports on the results of typhoid fever *vaccination* in the German Army. Among more than 8000 inoculated no lasting harm was observed. On the other hand, the treatment seems

to have been beneficial in regard to both morbidity and mortality. The beneficial effect on the course of the disease is shown by dividing the cases into (1) the fatal, (2) the severe, (3) the moderate, and (4) the light.

	Fatal.	Severe.	Moderate.	Light.
In the inoculated per 1000	3.3	: 8.9	: 13.2	: 25.5
Or as	1	: 2.7	: 4.0	: 7.7
In the uninoculated per 1000	12.6	: 25.4	: 24.4	: 36.2
Or as	1	: 2.0	: 1.9	: 2.9

M. Richardson (*Boston Med. and Surg. Jour.*, Oct. 3, 1907) has treated 132 cases of typhoid fever with *specific typhoid products*, serum, bouillon filtrates, and the non-toxic residue of the typhoid bacillus as prepared by Vaughan of Ann Arbor. The results were largely negative with one exception. By continued inoculation during convalescence with the non-toxic residue the occurrence of relapses was reduced apparently from 22 to 5 per cent.

E. Michaelis (*Medizin. Klinik*, 1908, No. 2) reports the successful arrest on two occasions of severe *typhoidal hemorrhage* by rectal injection of a 5 per cent. solution of *gelatin*, one litre being injected at a temperature of 50° C. (122° F.) in four portions. The fine results in this case encouraged further trials, and 11 other patients with intestinal hemorrhage were treated with injections of a 5 to 20 per cent. solution of gelatin at temperatures ranging from 115° to 122° F., in amounts of from 250 c.c. to a litre, from two to four times a day. Hemorrhage was completely arrested in every instance. The foot of the bed was raised and the fluid was injected very slowly and under low pressure to avoid inducing a desire for defecation.

Pneumonia.—Testimony to the value of the *open-air treatment* of pneumonia continues to appear. W. G. Thompson (*Amer. Jour. Med. Sci.*, Jan., 1908) gives his experience with it at the Bellevue and Presbyterian Hospitals, New York City. The treatment is carried out by placing the patient on a balcony, or at least at an open window, the air of the ward being more or less excluded by a screen. The balcony floors are of wooden slabs and sometimes it was so cold that the sputum froze in the cups. The results, however, were most gratifying. It was the universal testimony of the nurses that they had much less "nursing" to do, the patients being so much quieter, less actively delirious, or less complaining, and slept so much better.

It was the universal testimony of the patients themselves, as their mental state improved, that they felt much better outdoors. In alcoholic subjects it was found that considerably less stimulation was required, and it was often possible to do without it altogether.

G. W. Norris (*American Jour. Med. Sci.*, Nov., 1908) also finds that the mortality in 445 cases of pneumonia under the fresh-air treatment at the Philadelphia General Hospital was distinctly less than in a series of 991 cases treated in the ordinary way in the same institution. He is of the opinion that anyone who has the courage to try the *fresh-air treatment*, and sufficient persuasive power over the patient's relatives to allow it to be tried, will never abandon it, even though the future may bring a specific for pneumonia in the form of a curative serum.

S. West (*Practitioner*, April, 1908) states that it is a good rule not to allow the patient to leave his bed until the temperature has been normal for at least ten days. During convalescence the pleura and pericardium should be regularly examined. Hyperpyrexia calls for the cold bath, cradling, or packing. A hot bath is better for children. Antipyretic drugs should be avoided. Cardiac failure is the chief danger. When the lungs are greatly engorged, the patient cyanosed, and the right heart overdistended marked relief may be given by blood-letting, free and rapid, a pint or a pint and a half in full-blooded, healthy patients. It is contraindicated in the weakly. Stimulants are not ordinarily required, but may be necessary for the aged and feeble and in persons of alcoholic habits. For pain West has not found cold applications either so successful or agreeable as leeches or counterirritation. Hyoscine and veronal, which have been highly praised, are both risky remedies. In extreme cases recourse must be had to morphine, but narcotics of any kind must be used with discrimination.

Hiss and Zinsser (*Jour. Med. Research*, 1908, ix) give the results obtained by them from experiments on the curative effects of watery *extracts of leucocytes* in infections. Their immediate object was to determine whether or not extracts of leucocytes have any curative effects on established infections. The leucocytes were obtained by intrapleural inoculations of aleuronat, which gives rise to abundant and richly cellular exudate. Seven patients with pneumonia were treated, and although the number was too small to be

considered statistically, the uniformity with which the temperature fell after a single injection of the extract of the leucocytes was noticeable, and taking it all in all, Hiss and Zinsser gained the impression that the treatment was not unlikely to prove of value.

Scarlet Fever.—K. Oppenheimer (*Münch. med. Woch.*, 1904, iv) discusses the treatment of scarlet fever with particular reference to *baths* and *diet*. He does not employ baths and cold sponging unless the nervous system is affected. He considers their influence dangerous for the heart, and, more particularly through the possibility of taking cold, for the kidneys. Cold water, especially if applied in the form of packs, is almost certain to congest the kidneys and lead to nephritis. In the first stage of the illness his treatment is purely expectant; rest with plenty of water is probably all the child requires during this time; if the child does not wish to eat or drink he does not force food, but considers the rest more important. As soon as the patient evinces some appetite milk is given, also diluted tea; later in the disease any food usually given a child is allowed, with the exception of meat, eggs, and their products. He emphasizes that none of the foods must be salted too much. He keeps his patients in bed for from five to six weeks; in the sixth week he permits warm bathing, using a 1 per cent. corrosive sublimate solution for the body. He has not seen a single kidney complication during the last eighteen years, although he has treated in that time more than 150 cases.

W. Pulawski (*Deutsch. med. Woch.*, Jan. 30, 1908) has used *Bujwids's antiscarlatinal serum* since 1904 in every case of scarlet fever. He has divided his cases into three groups—(1) hopeless, (2) severe, and (3) moderate and mild. Forty-eight patients, belonging to groups 1 and 2, were treated in the ordinary way, and 69 by serum. Of these, 20 of the first class died, representing a mortality of 41.6 per cent.; while 10—that is, 14.5 per cent.—of the second class died. The serum was injected on the second day in 17 cases, on the third day in 26 cases, while the number of those injected on subsequent days was smaller. The quantity of serum injected was mostly 10 or 20 c.c, but in a few cases as much as 40 or even 60 c.c. were given. Albuminuria was seen in only 7 per cent. of the cases, and only in fatal cases. He considers that the serum is absolutely harmless, and that by its means he obtained

more than three times as good results as he obtained by other means. He considers that the serum not only lessened the severity of the symptoms, but also shortened the course of the illness; and that in the severe and also moderate cases it rendered the convalescence more rapid.

H. Cumpston (*British Med. Jour.*, May 30, 1908) has used a polyvalent serum, obtained by immunizing horses against cultures of streptococci isolated from various cases of scarlet fever, in 42 cases of scarlet fever. His impression formed from a study of these cases is that injections of the serum in large enough doses (not less than 50 c.c., subcutaneously, or preferably intravenously), and early enough in the disease—that is, as soon as the onset of rhinorrhœa, swelling of the cervical glands, and superadded rise of temperature occurred—produce a marked improvement in “septic” cases. In many instances within 48 hours of the injection the temperature began to fall, swelling of the glands began to subside, and the rhinorrhœa ceased, or lost its purulent character. In the “toxic” cases, however, little can be said of the serum, but some slight improvement appears to have occurred in two instances.

Diphtheria.—The excellent results obtained under the antitoxin treatment of diphtheria have caused physicians to neglect to a certain extent the local treatment of the throat, and at present it is customary merely to keep the parts clean by means of mild antiseptic washes. Recently R. Mühsam (*Deutsch. med. Woch.*, Feb. 6, 1908) has investigated the local action of *pyocyanase* and substantiates in part the claims made for it. *Pyocyanase* is an enzyme obtained from cultures of *Bacillus pyocyaneus*. It has a marked bacteriolytic action, and, according to Emmerich and Low, not only on the *pyocyaneus* bacilli, but also on diphtheria, cholera, typhoid, and other bacilli, as well as on streptococci and staphylococci. The epidemic of diphtheria in Berlin during the latter part of 1907 appears to have been a severe one, and yielded a mortality of 17 per cent. Mühsam gained the impression from his experience with *pyocyanase* that it assists in removing the membrane and in improving the general condition, and states that one is justified in recommending it in conjunction with but not to the exclusion of antitoxin.

Saar (*Deutsch. med. Woch.*, Sep. 8, 1908) has used *pyocyanase*

in 39 cases of various throat infections, including diphtheria, scarlet fever, severe tonsillitis, and Vincent's angina. The throat was sprayed with the solution three or four times a day. Clinically, Saar observed a rapid diminution of the membrane in diphtheria. The sore throat of scarlet fever was quickly relieved and the membrane disappeared in three or four days. Cases of tonsillitis were also speedily benefited. He regards pyocyanase as a useful adjuvant to antitoxin in diphtheria. From an experience with pyocyanase in 48 cases of diphtheria, W. Fackenheim (*Therapeut. Monatshefte*, August, 1908) is also convinced that it is an important aid in severe cases. P. Schlippe (*Deutsch. med. Woch.*, 1908, xxxi) draws the following conclusions from a study of 54 cases of diphtheria treated with local applications of pyocyanase: Pyocyanase must never be used without simultaneous injection of serum. In some cases the remedy seems to quicken the solution of the false membrane, to remove the fetor of the breath, and to produce immediate subjective improvement. It deserves to be employed further, therefore, in cases of intense membrane formation and when the membrane persists abnormally long. In very grave cases of septic diphtheria pyocyanase does not seem to have any influence. It does not prevent the persistence of the diphtheria bacilli, nor does it kill the bacilli in instances of marked persistence and chronic diphtheria.

Several theories have been advanced to explain the *sudden deaths* that occasionally occur after the use of antidiphtheritic and other sera. Recent studies make it appear highly probable, however, that such catastrophies are the result of intoxication with a foreign protein in persons who have been sensitized to this protein, often in some unknown way. In order that a second or intoxicating dose of serum may produce lethal effects it must enter the circulating blood in something more than infinitesimal amounts. Presumably it is in the central nervous system that the foreign protein produces its effects, and it must reach this tissue by the blood in not too extreme dilution. Lewis (*Jour. Exper. Med.*, 1908, x) states that 0.01 c.c. of serum by the intracardiac route is a certainly fatal dose for sensitized animals; whereas by the subcutaneous route, he says, "it is probably impossible to reach the certainly fatal dose because of the impossibility of getting rapid absorption." It "seems very probable," states an editorial writer in the *Journal of the American*

Medical Association for Oct. 3, 1908, "that the few cases of fatal intoxication with foreign serum represent the occasional instances in which the serum has been injected directly into a vein in a person who has been previously sensitized. Injections should be made in all cases with a glass-barrelled syringe, and by gentle aspiration before injection the presence of the point of the needle in a vein would be indicated by the entrance of blood into the syringe. If one had reason to fear sensitization, knowing that the patient had previously been injected with serum, it would undoubtedly be well to give but a small fraction of the serum, say 0.5 c.c., at the first dose, waiting a few hours before the second; for it is known that sensitized animals receiving less than a fatal dose at the second injection are then refractory to large doses given a few hours or days later. This latter precaution, of injecting a small preliminary dose to sensitized patients, has already been advocated and used by V. C. Vaughan, Jr., and possibly by others."

Erysipelas.—H. Tucker (*Therapeutic Gazette*, June, 1908) reports excellent results in 19 exceptionally severe or complicated cases of erysipelatous infection from the local application of a *saturated aqueous solution of magnesium sulphate*. In 35 uncomplicated cases all patients recovered in from two to seven days, the pain and local discomfort being relieved in a few hours. No other treatment was employed. The solution is applied in facial cases on a mask consisting of from 15 to 20 thicknesses of ordinary gauze, of sufficient size to extend well beyond the area involved, a small opening being made to permit breathing; no opening is made, however, for the eyes. The mask is thoroughly saturated with the liquid and covered with oiled silk or wax paper, and wetted as often as necessary to assure a moist dressing—usually once in two hours, depending on the time of year or temperature of the room. The dressing should not be removed oftener than once in twelve hours to permit inspection of the parts, and then should be immediately reapplied; the infected area should not be washed while the treatment is employed.

Cerebrospinal Fever.—Reports from various sources indicate that the use of *specific sera*, as suggested by Wassermann in Germany and by Flexner in this country, marks a notable advance in the treatment of this disease. The serum of Flexner has been

the one chiefly employed during the past year. Briefly, it is produced in horses by subcutaneous inoculation of dead cultures, living cultures, and autolysates of dead cultures. Many different strains of the meningococcus are used. After a year of immunization the serum of such a horse is ready for use. Flexner and Jobling (*Jour. Exper. Med.*, 1908, i) give the following instructions for the use of the serum. The serum should be kept in a refrigerator until it is to be used, when it should be warmed to the body temperature. It should be injected directly into the spinal canal after withdrawal of cerebrospinal fluid (preferably as much as the serum to be injected) by lumbar puncture. The quantity of serum for a single injection should not be less than 30 c.c. The injection should be made slowly and should be repeated every twenty-four hours for three or four days or longer. Although the best results have been obtained when the injections have been made early in the disease, no case should be considered hopeless. In another article (*Jour. Exper. Med.*, 1908, v), Flexner and Jobling give the results obtained in 400 cases of epidemic meningitis treated with the serum. These cases occurred in epidemics and sporadically in various parts of the United States, Canada, and Great Britain. Excluding cases in which death occurred within twenty-four hours after the first injection and cases in which there were intercurrent fatal complications, there remain 393; of these 295 recovered, or 75 per cent. In cases between the ages of five and ten years the mortality was only 11.4 per cent. Among 22 infants under one year of age there were 11 recoveries (50 per cent.). Under all other forms of treatment the mortality of the disease in the past has been in the height of epidemics in the United States about 75 per cent. Sladen (*Johns Hopkins Hosp. Bull.*, 1908, cciv) says that during the years 1889 to 1907 there were 33 cases of cerebrospinal fever treated at the Johns Hopkins Hospital, of these 21 died and 12 recovered, a mortality of 64 per cent. In 1908 there were 19 cases, all of which received Flexner's serum. Of these, 16 recovered and 3 died, a mortality of 16 per cent. Of the cases that died, 1 was fulminant; 1 was a child aged 29 months, admitted on the fourteenth day of the disease, who died within forty-eight hours; and 1 was a stout woman with bronchopneumonia.

L. W. Ladd (*Jour. Amer. Med. Assoc.*, Oct. 17, 1908) has

used Flexner's serum in 31 cases. Of these 20 patients recovered—a mortality of 35.5 per cent. and a recovery of 64.5 per cent. Four of the patients were moribund at the time of the administration and a fifth patient had had the disease for nearly four months. Miller and Barber (*Jour. Amer. Med. Assoc.*, June 13, 1908) treated 12 patients without serum; of these but one recovered; and then treated 4 patients with serum, and of these three recovered.

Tuberculosis.—At the recent meeting of the International Congress on Tuberculosis, L. F. Flick (*Jour. Amer. Med. Assoc.*, Oct. 10, 1908) gave as the essentials of the treatment of tuberculosis properly selected diet, fresh air, and such indication as is necessary to restore the organism to its physiologic functions. When the disease is far advanced more heroic treatment is necessary. Complete rest in bed for a certain period should be insisted on, comparative rest for a time longer, and after that the patient may be allowed carefully graduated exercise. In the early stage tuberculosis can be treated at home as successfully as in any climate. When proper discipline cannot be enforced at home, however, the patient should be sent to a sanatorium in the climate to which he has been accustomed.

On the ultimate results of *sanatorium treatment* Lawrason Brown (*ibid.*) reported as follows: Of the first 300 patients at the Adirondack Cottage Sanatorium 36 per cent. are untraced, and only 10 per cent. of the last 2400. Of the 1209 patients now known to be living out of 2553, 1058, or 41 per cent. of the whole, are engaged in, or able to do, some work. Of these patients, 353 remain untraced; and if we consider only the 2200 traced, 48 per cent. are able to work. Out of 1209 patients living, 87.5 are still able to work. Sixty-three patients discharged from 15 to 23 years ago are still living. When it is considered that fifty years ago no one was thought to recover from pulmonary tuberculosis, results such as these are very encouraging.

The rehabilitation of *tuberculin* as an adjuvant to hygienic and dietetic measures seems to be well nigh complete. E. Trudeau (*Jour. Amer. Med. Assoc.*, Oct. 17, 1908) writes that a clearer conception of what we are trying to accomplish by tuberculin treatment is necessary. There are two main theories: the vaccination theory, which claims to bring about by injections a specific immunity

to the tubercle bacillus; and the toxin-immunization theory, which aims merely to produce by steady and gradual progression in dosage the greatest degree of tolerance or immunization to the chemical poison of the bacillus. Under the first conception, the specific immunization to the bacillus, are Koch's later attempts at producing an immunizing tuberculin, both local and focal reactions being looked on as useful in the production of the specific immunity to the bacillus; also the work of Wright and his vaccine treatment guided by the readings of the opsonic index. Under the toxin-immunization theory, of which Denys and Sahli are the most brilliant exponents, the main feature of the treatment is to produce by progression in dosage the highest degree of tolerance to the poison of the bacillus attainable, considering reactions and all constitutional disturbance as not only not desirable, but to be avoided as much as possible. Neither theory is quite satisfactory. Trudeau prefers, however, for the present to hold to the view of an immunity that is principally, at least, antitoxic as produced by the treatment and to consider tuberculin habituation its essential feature and best guide to dosage. If we hold to this conception, instead of measuring the degree of questionable antibacterial immunity by the opsonic index or attempting to produce it more or less empirically by a series of reactions the severity of which we cannot in any way control, the main features in treatment would be: To raise the degree of tolerance to tuberculin to the highest point attainable in each case by an almost imperceptible and long-continued progression in dosage; to avoid focal and general reactions as much as possible and consider them merely an evidence of intolerance; to follow no arbitrary rule as to rate of increase or maximum dose to be reached, but to be guided merely by the degree of toxin tolerance of each patient as shown by the symptoms and general condition, whether the highest individual maximum dose attainable be only a small fraction of a milligram or a cubic centimetre or more.

O. Amrein ("Beiträge z. Klin. d. Tuberk.," 1907, Sept. 4), P. Hilbert (*Deutsch. med. Woch.*, Dec. 12, 1907), Ritter (*Deutsch. med. Woch.*, July 6, 1908), and J. Miller (*New York Med. Jour.*, Sept. 5, 1908) also find tuberculin a useful aid to hygienic and dietetic treatment, but warn the physician against regarding it as a panacea.

B. L. Wright (*U. S. Naval Med. Bull.*, April, 1908), observing that the pulmonary tuberculosis of syphilitics improved while they were taking antisyphilitic remedies, placed ten tuberculous patients on mixed treatment. The men all improved to the point where the medicine deranged the digestive tract, when it had to be discontinued. Later Wright and Bucher used *mercury succinimide* in deep muscular injections. Two cases are fully reported and thirty-three are reserved for future publication, but of the entire number thirty are said to be showing marked improvement, while the other five are holding their own. No history or trace of syphilitic infection could be discovered in these patients. In a later communication (*Jour. Amer. Med. Assoc.*, Nov. 28, 1908), Wright reaffirms his belief in the efficacy of the mercurial treatment and presents some remarkably strong evidence in its favor. One injection of hydrargyri succinimidum ($\frac{1}{8}$ grain, 0.013 Gm.) is given every other day until thirty injections have been given. Then injections are discontinued and potassium iodide (3–10 grains, 0.2–0.6 Gm.) is given, well diluted with water, one-half hour after meals for two weeks. Then potassium iodide is withdrawn and no medication is given for one week. Injections are then resumed as follows: One injection every other day until thirty injections have been given, on alternating injection days giving mercury succinimide ($\frac{1}{8}$ grain, 0.013 Gm.; and $\frac{1}{10}$ grain, 0.006 Gm. respectively). After the thirtieth injection the same course of potassium iodide is given as followed the first series of injections; then a week free from medication. The injections are then resumed again, the succinimide ($\frac{1}{10}$ grain, 0.006 Gm.) being given every other day until thirty injections have been given. By the end of this third series experience will direct any necessary further treatment. At times the injection produces a slight febrile reaction, after which the temperature should fall to what it was prior to the injection. If the drop fails to occur or the temperature rises after the second injection, the dose should be reduced at once.

Tetanus.—R. T. Miller (*Amer. Jour. Med. Sci.*, Dec., 1908) reports a case of severe tetanus in which recovery occurred under *subarachnoid injections of magnesium sulphate*, and reviews the reports of eleven other cases in which the same treatment was employed. The amount of sulphate injected in most of the cases

was from 2.5 to 4.5 c.c. of a 25 per cent. solution. In Miller's case eleven injections of 2.5 c.c. of a 25 per cent. solution were given in thirteen days. The chief danger lies in the depressing influence of the drug upon the respiratory centre. Of the 11 cases, 5 patients recovered, a mortality of 55 per cent. In 3 cases the sulphate (2-3 drams) was given subcutaneously, and in this group there were 3 recoveries.

Constitutional Diseases

Diabetes Mellitus.—Labbé (*Presse Méd.*, 1907, lxxxii) has shown that *potato starch* is better borne by diabetics than that of other carbohydrate foods, and especially that it is preferable to that of bread. The potato is better tolerated than milk sugar, and it has distinct advantages over oat meal and the leguminous vegetables. Potatoes contain two and a half to three times less starchy matter than bread, and may be employed to the exclusion of the latter. It will usually be found easier to cut out bread entirely from the diet than to diminish its amount, and the substitution of potatoes for it is generally acceptable to the patient. An additional advantage of the potato diet is that it increases the tolerance for and absorption of fatty foods. Labbé does not contend that the potato diet has any specific action, and holds that in diabetic diet the quality of the carbohydrates taken should be regulated rather than their quantity.

A. Schmidt and H. Lohrlich (*Deutsch. med. Woch.*, 1908, xxxiv, No. 47) announce that certain diabetics are able to tolerate considerable quantities of *cellulose* in the form of agar-agar. Patients unable to assimilate 10 grams of grape sugar or 20 grams of starch without appreciable increase in the glycosuria were able to tolerate perfectly from 18 to 36 grams of a pulverized preparation of agar-agar, which can be mixed with soup without impairing the taste. Agar hemicellulose is galactan, and yields by hydrolysis a large amount of sugar in the form of galactose. Clinical research has shown that galactan is only gradually transformed into sugar and absorbed from the ingested preparation, and that this slow, gradual assimilation is the principal reason for its toleration by the diabetic.

Zuelzer (*Ztschr. f. exp. Path. u. Therap.*, 1908, v, 306) gives the results obtained by the injection of the *extract of pancreas* in

eight cases of diabetes in man. The extract was prepared from pancreatic glands taken from animals at the height of digestion. Except in a few instances, the treatment was productive of a marked decrease in the glycosuria for two or three days after the injections, the same also holding good of the acetonuria. On several occasions the injections were followed by chill, rise in temperature, and, less often, by a stomatitis, the symptoms passing off in one or two days. In all the experiments no change was made in the diet. In the future Zuelzer proposes giving smaller doses at more frequent intervals, hoping thus to avoid the unpleasant consequences. His conclusion is that it is possible to cause sugar, acetone, and diacetic acid to disappear from the urine of diabetics by the injection of pancreatic extracts. To what extent this fact may be utilized therapeutically remains to be determined.

Rachitis.—T. S. Southworth (*Jour. Amer. Med. Assoc.*, Jan. 11, 1908) remarks that it is a mooted point whether general tenderness of the body belongs to the symptomatology of rickets or denotes a tendency to scurvy, but fresh *orange juice*, which has such a signal effect on scorbutus, has also a beneficial influence on rachitis. After the fifth or sixth month or even earlier we may also begin the administration of pure *cod-liver oil*, at first in small quantities and increased with tolerance to half a dram or more three times a day. If not well borne, and especially in warm weather, pure olive oil has considerable value as a substitute. More than usual attention should be given to securing the ingestion of an adequate quantity of *proteid*, and usually by the seventh month, if need be, and assuredly in the later months of the year, this may be assisted by administration once daily of beef-juice or the white of one egg, the latter incorporated with the contents of one of the bottles. In older children scraped rare meat may be given at once, and soft-boiled eggs are of important assistance in making up for previous proteid deficiencies in the diet. Total exclusion of starchy food is by no means always necessary. Cereal additions to milk make available a considerable amount of vegetable proteid and mineral matter which are promptly assimilated by the underfed organism. There surely is no contraindication to the judicious use of suitably prepared starchy food when any considerable degree of intestinal digestion is lacking. *Phosphorus*, Southworth finds, is

the medicinal agent which can be relied on to cut short most promptly the acuter symptoms of the rachitic process.

Gout.—Sikes (*Practitioner*, 1908, lxxx) states that there seems to be a general tendency toward the recommendation of a *simple mixed diet* for the average gouty patient. Also, it is now customary to modify the diet to suit the individual digestion rather than to prescribe one that is free from this or that chemical element, as, for example, the quantity of purin. In average patients meat need not be forbidden, but the amount should be restricted to one meat meal in the day. We are coming more to consider the carbohydrate element of the food, and its effect on the liver, as of more importance than was formerly the case. Hence it is desirable to reduce the amount of carbohydrate which is taken in the comparatively pure form, such as potatoes, rice, etc. If we wish the digestion to proceed as normally as possible, and to avoid the absorption of imperfectly elaborated products, it is only rational to prevent the undue dilution of the gastric juice, consequently liquids during meals should be restricted as much as possible. Simple meals, limitation of carbohydrates, restriction of alcohol, and the drinking of non-alcoholic liquids between meals are the important points.

Diseases of the Blood and of the Ductless Glands

Pernicious Anæmia.—Acting on the assumption that pernicious anæmia is the result of hæmolysin and that *cholesterin* has the function of binding a complex hæmolysin which is found in the blood normally, K. Reicher (*Berlin. klin. Woch.*, 1908, 41 and 42) has employed cholesterin in the treatment of three cases of pernicious anæmia. A 3 per cent. solution in olive oil was prepared and 100 grams of this were administered daily. One patient remained unimproved, while in the other two the effect of the remedy was decidedly good. One of these patients was admitted in a wretched condition, with intense dyspnœa, general dropsy, and a red-cell count of 750,000, with 18 per cent. of hæmoglobin. After a week the count had risen to 1,750,000 and the hæmoglobin to 30 per cent., while the threatening symptoms had all disappeared. After a few weeks, however, no further gain was obtained and still later a relapse occurred which ended fatally. C. E. Simon (*Jour. Amer. Med. Assoc.*, Dec. 19, 1908) records the results obtained

with cholesterin in 6 cases of pernicious anæmia. Three patients were in an advanced stage of the disease and only lived for a few weeks; in these no effect from the treatment was observed. A fourth patient was discharged unimproved after a three weeks' course of the treatment and died a few days later. In the fifth only 24 grams had been given when the treatment was suspended, and death occurred shortly thereafter. In the remaining case the treatment seems to have been distinctly beneficial.

Leukæmia.—E. Grawitz (*Berlin. klin. Woch.*, 1908, xlv, No. 24) has had 41 cases of leukæmia under his care in the last three years. In 26 cases with mixed-cell findings in the blood, 12 of the patients were in the earlier stages and 10 of these were clinically cured by the application of *X-rays*, except that 3 had transient recurrence after a year or two of health. Two of this group were improved, but recurrence was soon observed and the ultimate outcome is unknown. In 14 cases in which the disease was of several years' standing, one patient has been cured for two years; one died uninfluenced; the others showed more or less improvement but no permanently favorable results. In the 15 cases with lymphoid findings, only one patient can be regarded as cured. One has died since of an intercurrent affection, 2 were improved, but have since died of recurrence. The others showed slight or no improvement. The author concludes that complete restitution need not be expected in cases of deep-rooted defective blood-production, but earlier diagnosis and better Röntgen technic will certainly improve the prospects in leukæmic conditions.

H. Harris (*Amer. Jour. Med. Sci.*, July, 1908) reviews the treatment of leukæmia by *X-rays* and concludes that they are effective only as a palliative measure, and that their action is associated with the production in the patient of a leucolytic body or bodies.

Stengel and Pancoast (*Jour. Amer. Med. Assoc.*, April 25, 1908) state that better results are achieved in leukæmia when the *X-rays* are applied to the bones, various portions of the body being treated in succession, and the spleen not exposed until it is considerably reduced in size and the patient's general condition is much improved, and even then only with caution. They claim that this method is more rational because treatment is directed to the primary focus and not against a secondary manifestation; that

toxæmia is avoided; that the spleen is diminished in size just as it is under direct splenic applications, only the process is slower; that, owing to the distribution of the applications, the risk of severe dermatitis is rendered very slight; and that the bone pains are very early relieved. Although this treatment requires a much longer period of time, the misleading tendency of a comparatively quick symptomatic cure, such as follows direct splenic applications, is avoided.

R. Larrabee (*Boston Med. and Surg. Jour.*, Feb. 6, 1908) has treated four cases of leukæmia with the *mixed toxins of streptococcus and Bacillus prodigiosus*. The first case was that of the myelogenous variety and was greatly improved. Of three lymphatic leukæmias, one was slightly improved and two were not improved. He thinks the results so far have been encouraging enough to justify further trial of the treatment. M. Richardson (*Amer. Jour. Med. Sci.*, Oct., 1908) also noted some improvement in a case of lymphatic leukæmia treated with the mixed toxins.

Hæmophilia.—M. Labbé (*Rev. de Médecine*, 1908, No. 2), in discussing the treatment of hæmophilia, states that the largest proportion of cures have been obtained with injections of fresh *normal blood-serum* as suggested by P. Weil (*INTERNAT. CLINICS*, series 17, vol. iv). This seems to be the remedy needed for the inherited or sporadic cases resulting from insufficiency of the blood-plasma, but it can do little good in hæmophilia resulting from abnormal permeability of the vessel walls. In sporadic hæmophilia intravenous injection of from 10 to 20 c.c. of fresh serum causes coagulation to occur in a few minutes instead of the seventy-five minute interval previously noted in some patients. The effect of the serum is at its height in forty-eight hours, but lost at the end of five weeks. Repetition of the injection then has the same effect as at first. In familial hæmophilia the effect is less marked. The serum should be fresh, at most not over fifteen days old; human, horse, or rabbit serum may be used, or even antidiphtheria serum. Beef serum must be avoided as a febrile reaction is liable. The dose is from 10 to 20 c.c., injected into a vein at the elbow. If a subcutaneous injection is made this dose should be doubled. Gauze dipped in the serum has a powerful styptic action when a bleeding wound is dressed with it or the nose plugged in rebellious epistaxis.

The gauze has proved successful also in a number of cases in which bleeding persisted for hours after the extraction of a tooth. Leary (*Boston Med. and Surg. Jour.*, 1908, iii) also comments favorably on the treatment of hæmophilia and other hemorrhagic dyscrasias with fresh animal sera.

Exophthalmic Goitre.—Erb (*Medizin. Klinik*, 1908, iv, No. 1) treats this disease along the same lines as neurasthenia. He regards a sanatorium environment at an *altitude of 2400 to 5400 feet* as by far the most effectual measure in the majority of cases. Among drugs he places most reliance on arsenic, long continued, with “tonic pills” (iron, quinine, and nux vomica) to alternate with the arsenic. Bromides are indispensable, but he warns against iodides and digitalis, preferring strophanthus in cases of heart neuroses. He avoids operative intervention unless the condition becomes unbearable. Bier (*ibid.*), on the other hand, operates on every case of exophthalmic goitre in which the affection is not so far advanced that improvement is improbable.

B. Stiller (*Medizin. Klinik*, 1908, iv, No. 9) regards a *sojourn in the mountains* as an important factor in the treatment of functional nervous diseases, and especially of exophthalmic goitre. He believes that the heart affection in this disease has its roots in a neuropathic soil, and thus stands on another basis than *ab ovo* organic heart affections.

G. Schwarz (*Wien. klin. Woch.*, 1908, xxi, No. 38) reports 40 cases of exophthalmic goitre in which *X-ray treatment* was used. The nervous and especially the heart symptoms were promptly and permanently improved. The exophthalmos was improved in 15 patients, the goitre retrogressed in 8, 26 gained in weight, and 36 had the pulse reduced, while the benefit on the nervous system was marked in all. G. Pfahler (*New York Med. Jour.*, Oct. 24, 1908) draws the following conclusion from an analysis of the cases of exophthalmic goitre treated with X-rays and recorded in the literature. Decided improvement may be expected in about 75 per cent. of the cases. This improvement consists in an increase in weight and strength, and gradual disappearance of the Basedow symptoms. Some improvement should be noted within a month, and after from six to twelve treatments. When the treatment is properly given there appears to be no danger.

Bulkeley (*Boston Med. and Surg. Jour.*, 1907, clvii, 626) reviews the reported instances of Graves's disease which have received *serum treatment* and concludes that we may accept the statement that the palliative action of the serum seems certain, and cure may be possible. Improvement usually begins within seven days; if there is no improvement within three or four weeks the chances are against ultimate benefit. Patients without marked goitre, with slight tremor and exophthalmos, yield most readily. Of drugs, Bulkeley considers quinine hydrobromide the most efficient.

Blumenthal (*Folia Therapeutica*, 1908, ii) has used both an antithyroid serum (blood-serum of thyroidectomized sheep) and an alcohol ether precipitate of the milk of thyroidectomized goats in the treatment of Graves's disease, and finds that the former is decidedly more potent than the latter. Fedeli (*La Clin. Mod.*, Dec., 1907) reports excellent results in eleven cases of Graves's disease from the use of rhodagen, which is a precipitate from the milk of thyroidectomized goats. The dose was 15 to 30 grains (1.0–2.0 Gm.).

Jackson and Mead (*Boston Med. and Surg. Jour.*, 1908, clviii, 346) recapitulate their results with *quinine hydrobromide* as follows: 42 patients cured (no signs or symptoms for two years), or 76 per cent.; 7 patients benefited, or 13 per cent.; 6 failures, or 11 per cent. The salt, it is said, should be neutral, not acid, and should be given in doses of 5 grains (0.3 Gm.) thrice daily. Benefit is not to be expected in less than a month and the treatment must be continued for at least two years. The manner of action of the drug is not known. Lancereaux (*Bull. de l'Acad. de Méd.*, 1908, lxxii, No. 8) states that he has used quinine in large doses in twenty-one cases of exophthalmic goitre, and that the results have been very satisfactory.

H. Berkeley (*Johns Hopkins Hospital Bull.*, Sept., 1908) reports four cases of exophthalmic goitre, two of severe type in which *lecithin* in conjunction with a milk diet produced strikingly favorable results. Renon and Delille (*Tribune Méd.*, 1908, xli) have employed the *extract of the hypophysis* in Graves's disease on account of its known effect on arterial tension, tachycardia, and the thyroid gland. A number of patients were benefited, but no cures were effected.

P. Klemm (*Archiv f. klin. Chirurg.*, 1908, lxxxvi, No. i) reports his results in 32 cases of Graves's disease treated by *thyroidectomy*. There was no operative mortality, and out of 27 patients followed to date, from 15 months to 8 years, 25 are cured, one improved, and only one not improved. He operates at one sitting, using no anæsthetic except cocaine, and excises the half of the thyroid most involved, ligating the vessels of the other side of the gland.

Diseases of the Circulatory System

Chronic Valvular Disease.—T. C. Janeway (*Amer. Jour. Med. Sci.*, June, 1908) considers that the failure which sometimes accompanies the use of *digitalis* is due to the employment of inefficient preparations; use in unsuitable cases, improper dosage and method of administration, together with neglect of other necessary therapeutic measures. In order that an efficient preparation may be obtained the leaves must be from plants of second year's growth, picked at the beginning of efflorescence, freed from stalks, and carefully dried. These dried leaves must be kept absolutely dark, free from moisture, in sealed glass or tin receptacles, and the preparations dispensed must be made from these leaves, which must not be kept longer than a year. The infusion made by diluting the fluidextract is condemned as being the worst preparation, while the only solid form in which the drug can be reliably given is the freshly powdered leaf in capsule or pill. The official infusion and the tincture carefully prepared, and the powdered leaves, are regarded as the only reliable preparations. Two cases are quoted which showed marked and immediate improvement when put upon a reliable infusion after unreliable preparations had been unsuccessfully tried. Hypodermically there is as yet no ideal form of injection, but a good tincture is the most certain in its action. *Digitalis* is an ideal drug in general venous stasis, and nothing can compare with a good infusion in overcoming passive congestion and œdema, whatever the primary cause of the failing ventricle. It is seldom necessary to give more than 2 drams (8.0 c.c.) of a good infusion every four hours, but the drug should not be pushed for more than a few days without carefully watching the heart and pulse-rate, and the amounts of fluid taken and the urine excreted each twenty-four hours. Under precautions the dose of the infusion

may be increased to $\frac{1}{2}$ ounce (15 c.c.), or from 10 to 20 minims (0.6–1.2 c.c.) of the tincture may be given every four hours; and any marked decrease in the urine is an indication for its discontinuance, since with diminished excretion of the drug cumulative effects may arise. If the stomach becomes intolerant, $\frac{1}{2}$ ounce (15 c.c.) of the infusion three times a day per rectum will act as promptly as by the mouth, while urgent symptoms and extreme passive congestion of the abdominal viscera indicate hypodermic medication. Rest and sleep are important adjuvants, and the restriction of fluid intake by a dry diet is essential in dropsical patients; while free purgation, by relieving secondary portal congestion, will relieve much of the digestive disturbances. As regards the giving of digitalis in aortic insufficiency Janeway believes that if there is loss of tone and diminishing systolic output, with scanty urine, congested liver, and dropsy, digitalis should be given, but if the symptoms are merely orthopnea, or paroxysmal dyspnea, or anginoid pain, then digitalis has no place.

Lust and Hoepffner (*Deutsch. med. Woch.*, 1908, xcii) relate their experiences with the intravenous use of *strophanthin*. Lust's conclusions are as follows: Acute cases of cardiac insufficiency in which digitalis works too slowly can be favorably influenced in a few minutes by a single injection of *strophanthin*; occasionally a second dose may be necessary. A diminution of the pulse-rate with an increase in the size of the individual beats occurs in a few minutes, increased diuresis follows in a few hours, and the general condition improves. Given in combination with digitalis it serves to increase and maintain the digitalis stimulation; for this purpose it should be given in small and repeated injections. It should be given in doses of $\frac{1}{100}$ to $\frac{1}{80}$ grain (0.0005–0.001 Gm.); often $\frac{1}{100}$ grain (0.0003 Gm.) will be sufficient to begin with. To prevent a cumulative action, injections of $\frac{1}{80}$ grain (0.001 Gm.) should not be repeated oftener than once in twenty-four hours. It is of no therapeutic value in nephritis when other diuretics fail, and it is of no value in pneumonia. Hoepffner sums up the indications for the use of *strophanthin* as follows: (1) Severe cardiac insufficiency, in which digitalis has lost its effect. (2) To reinforce digitalis therapy and to shorten the period of use of digitalis. (3) Cases of cardiac insufficiency in which other means have failed.

Hay (*Practitioner*, 1907, lxxix) states that *morphine* is of recognized value in the treatment of cardiac dyspnoea, a fact easily appreciated when one realizes that the dyspnoea is largely subjective and that its severity bears no relation to the frequency of the respiration or cardiac pulsation. Cardiac dyspnoea may be associated with two entirely different phases of arterial blood-pressure, and in both of these morphine is useful. In patients with low pressure the trouble is primarily valvular. For these patients, when there is much failure, the morphine should be combined with digitalin or with digitalin and atropine, in order to tone the failing myocardium and at the same time to relieve the subjective sensation of dyspnoea. If the blood-pressure is high, probably over 200 mm. of mercury, the morphine should be combined with a vasodilator, given by the mouth or hypodermatically.

C. Allbutt (*Folia Therapeutica*, 1908, ii), in discussing the treatment of angina pectoris, considers that we have to regard three purposes: to mitigate, if possible, the lesion of the aorta, to reduce the stresses, and to block the inhibitory influence on the heart. To combat the local lesion we may use antidotes, as iodides, if there be syphilis. In relieving tension we have first the use of gentle frequent mercurials and salines in such patients as tolerate them. Then comes the promotion of normal metabolism, first by means of carefully regulated exercise and diet. Alcohol, strong tea, and coffee must be forbidden. The angina itself should first of all be treated by rest in bed, though in old persons we must carefully guard against pulmonary congestion in ordering recumbency. With regard to vasodilators, we have in nitroglycerin a drug that must be watched; for while Osler states that if necessary 30 minims (2.0 c.c.) of one per cent. solution may be given thrice daily, Allbutt has noticed a tendency to habit-formation. With regard to iodides, unless syphilis is present, 3 to 5 grains (0.2–0.3 Gm.) thrice daily are sufficient. Venesection may be employed if high arterial tension is primary and persistent. In the palliation of attacks nitrites are our chief reliance, but Allbutt urges the importance of blocking the reflex by which the heart is inhibited. This seems to be best accomplished by means of atropine, and he is accustomed to advise its administration until the liability to an attack seems to have vanished; and on the access of an attack he orders an imme-

diate hypodermic dose. Morphine is also a useful palliative. If Cheyne-Stokes breathing occurs, inhalation of oxygen and carbon dioxide alternately, or one of them in its appropriate interval, may be helpful.

High Arterial Tension.—L. Brunton (*Lancet*, Oct. 17, 1908) writes that indications for treatment are the limiting of proteid food, especially meat, and restricting the patient to bread, vegetables, fruit, buttermilk, and fat bacon. Alcohol, tea, coffee, and tobacco should be used sparingly, if at all. Little fluid should be taken with meals; plain water, hot water, or mineral water may be taken freely about three hours after meals. Moderate exercise is beneficial, but all strain, mental or physical, must be absolutely avoided. Constipation must be prevented; mercurials have an especially beneficial action— $\frac{1}{2}$ or 1 grain (0.03–0.065 Gm.) of calomel, or from 3 to 5 grains (0.2–0.32 Gm.) of blue pill may be given once or twice a week, followed by a saline in the morning. Potassium iodide, one to ten grains (0.065–0.65 Gm.), given thrice daily is useful. Other remedies are ammonium or sodium hippurate, sodium benzoate, sodium nitrite, potassium nitrate, and potassium bicarbonate. When the heart begins to fail, cardiac tonics should be combined with vasodilators, and rest, comparative or absolute, insisted on. When flatulent distention in these cases causes much distress, Brunton finds the following mixture useful:

R Spiritus glycerylis nitratis, ℥ss–iii (0.03–0.18 c.c.);
 Spiritus ammoniæ aromat., ℥xv–fl ʒi (1.0–4.0 c.c.);
 Spiritus ætheris comp.,
 Tincturæ cardamomi comp., aa, ℥v–x (0.3–0.6 c.c.);
 Aquæ menthæ piperitæ, fl ʒi (30.0 c.c.).

This draught may be repeated every quarter of an hour till relief is obtained or until the nitroglycerin causes giddiness. Inhalations of amyl nitrite, chloroform, ethyl iodide, or subcutaneous injections of morphine may be necessary.

Diseases of the Respiratory Tract

Acute Bronchitis.—Eustace Smith (*Brit. Med. Jour.*, Feb. 29, 1908) makes a plea for the more frequent use of *antimony* in the treatment of acute catarrhal conditions of the chest. He believes that it has never been dislodged from its eminence by later substi-

tutes. It is advisable to prescribe it in small doses, frequently repeated, rather than in large doses at long intervals. It is well to continue the drug with potassium nitrate, ammonium acetate, spirit of nitrous ether, or other diaphoretics. The most convenient preparation is the wine of antimony, of which from 2 or 3 (0.12–0.18 c.c.) to 10 or 15 minims (0.6–1.0 c.c.), according to the age and condition of the patient, may be given, combined as above, every hour or two hours so long as the symptoms are acute. Great severity of the attack is no bar to the use of the drug; indeed, the opposite is the case, for when the distress is great, the breathing difficult, the coughing hacking and incessant, and the pulse small and feeble, the beneficial effects of the drug are most decided. In these severe cases the remedy should be pushed with a prudent liberality.

Chronic Bronchitis.—A. G. Auld (*Brit. Med. Jour.*, Feb. 15, 1908) considers that there are three drugs especially useful in chronic bronchitis, namely, *potassium iodide*, *balsam of Peru*, and *oil of turpentine*. He has found balsam of Peru the most efficacious and the most generally applicable. It acts quickly, diminishing the mucous expectoration. Patients often return in a few days saying that the expectoration has changed from yellow to white, and the cure is frequently rapid. Even in cases with scanty secretion it is sometimes extremely serviceable. Oil of turpentine is particularly useful in very advanced cases with abundant expectoration, but it is not easy to lay down definite rules for the administration of either of these substances. When the expectoration is already free we may begin at once with the balsam of Peru in doses of 10 to 20 minims (0.6–1.2 c.c.) in an agreeable emulsion. Very shortly a decided improvement will have set in and no further treatment may be necessary. If, on the other hand, the sputum be scanty and difficult to expel we begin with potassium iodide (5–7 grains, 0.3–0.5 Gm.), and, having obtained a free expectoration, follow up with the balsam. The addition of ammonium chloride and sodium bicarbonate assists the action of the iodide.

G. Campanella (*Gaz. degli Osped. e delle Clin.*, 1908, **xxxix**, No. 110) reports favorable results in the treatment of chronic bronchitis from the inhalation of the steam from boiling water containing a few drops of *nitric acid*. The fumes are inhaled for five or ten minutes at a time. They not only arrest the cough and

reduce the expectoration, but they modify the catarrhal process, and ultimately promote a cure.

Hæmoptysis.—G. A. Grace-Calvert (*Brit. Jour. of Tuberculosis*, 1908, ii) reviews the many reports for and against the use of *amyl nitrite* in hæmoptysis, and concludes that the following points are in favor of the drug: It acts instantly, producing an immediate fall in blood-pressure at the bleeding points, thus giving time for clotting to take place, while the bleeding usually ceases at once. It apparently produces an intense anæmia of the lung parenchyma without any reactionary hyperæmia, such as follows the use of adrenalin. The capsules can easily be carried by the patient, who can inhale the contents of one as soon as the bleeding begins, thus starting in the treatment at once and often preventing a worse attack. Calvert considers this drug, then, to be the most efficient of all and by far the best one to administer first. Braga (*Gaz. degli Osped. e delle Clin.*, Dec. 22, 1907) has tried amyl nitrite fifteen times in seven cases of hæmoptysis, and found it uniformly successful. A. Campani (*Gaz. degli Osped. e delle Clin.*, Mar. 8, 1908) also speaks favorably of amyl and sodium nitrite in the treatment of hæmoptysis.

Pleurisy with Effusion.—C. Achard (*Semaine méd.*, 1908, xxviii) advocates the *insufflation of air* in the treatment of pleural effusion, a method first advocated by Potain in 1889. The precaution of sterilizing the air Achard does not think necessary; in passing through the tube and flask, using an ordinary vacuum or bicycle pump, the air sterilizes itself sufficiently. It takes the place of the heavy fluid, thus relieving the weight on the diaphragm and heart, and at the same time keeping up a gentle compression of the lung. He has used this method often and finds that it is of great help, seeming to prevent or delay a refilling of the pleural cavity. It also obviates all dangers from the too rapid removal of the fluid, which sometimes causes pain, cough, dyspnoea, and albuminous expectoration. The insufflation should be stopped at once when the patient complains of the least discomfort. J. Barr (*Monthly Cyclop. of Prac. Med.*, 1908, xi, i) advises early removal of the fluid in its entirety, but before any negative pressure is established and before the patient feels any discomfort the siphon is stopped and an amount of air about equal in volume to the fluid withdrawn is

introduced into the pleural sac, then the remainder of the fluid is drawn off and a dram (4.0 c.c.) of 1 to 1000 adrenalin solution, diluted with about twice this amount of normal salt solution, is injected, and if it seems necessary more air is introduced to make the total amount equal to half or three-fourths of the bulk of the fluid withdrawn. A siphon is preferable to an aspirator.

Diseases of the Kidneys

Nephritis.—Rovighi (*Rif. Med.*, April 27, 1908), in a clinical lecture on the above subject, says we should aim at (1) removing everything likely to irritate the kidneys; (2) reduce, as far as possible, the congestion; (3) control the uræmic symptoms due to toxic products. With regard to the first object, there is nothing better than a milk diet. Experiments based on the effect of a milk diet on albuminuria are not entirely conclusive; as it is not safe to rely on one symptom only, the progress of a case of nephritis cannot be safely estimated merely on one symptom. Milk has strong antifermentative powers, it lessens the toxicity of the urine, is a good diuretic, has a sedative action on the nervous system, and lowers blood-pressure. An absolute milk diet may be enjoined for fifteen to forty-five days. It should be given in small quantities at frequent intervals, and may be rendered palatable by adding sugar, aniseed, chocolate, limewater, etc. If an absolute milk diet cannot be borne, a mixed diet may be given excluding foods likely to give rise to large quantities of extractions. The vegetable albuminoids are useful in this respect. Eggs, unless it is found they increase the albumin, may be allowed, the white being excluded if necessary. A moderate amount of exercise (all acute cases being excluded) is beneficial. A warm climate is also indicated. To relieve congestion, bleeding, sudorifics, saline injections, and in bad cases decortication are recommended. The author does not believe much in the drug treatment of albuminuria *per se*; milk is the best treatment. The reduction or complete absence of salt in the diet has a strong influence in reducing œdema. Curiously enough, a diminution of chlorides in the diet corresponds with an increased elimination of chlorides in the urine. Possibly this may be explained by the fact that an excess of chlorides in the blood irritates the vasal endothelium. When renal insufficiency exists the best

remedy is digitalis in the form of fresh infusion or as a definite preparation like digalen. The milder saline aperients are also useful. Chloral and bromide are suggested in acute uræmic convulsions. The author is evidently somewhat chary of using opiates in these cases, but speaks hopefully of surgical interference in the shape of decortication.

Diseases of the Digestive Tract

Gastric Ulcer and Hyperacidity.—Cowie and Munson (*Archives of Internal Medicine*, Jan., 1908) summarize the conclusions of their experiments as follows: *Olive oil* and *cotton-seed oil*, when given in connection with the usual test breakfast, decrease the gastric acidity at the end of the hour and retard the evacuation of the stomach. The beginning of the secretion of hydrochloric acid is delayed when oil precedes the meal; unchanged when oil follows the meal. The height of digestion is delayed when oil is given either before or after the meal. The height of secretion is lowered when oil precedes the meal, unchanged when oil follows the meal. If the progress of digestion is watched by the removal of small samples of stomach fluid at frequent intervals it will be observed, when oil precedes the meal by one-half hour, that at the end of what is usually taken as the digestive period for a test breakfast (three-fourths to one hour) the acidity is distinctly lower, while as great a height as is present in the control meal is frequently reached some minutes later. The action of oils on the stomach functions is only a temporary one. It has no effect on subsequent meals unaccompanied by oil. The therapeutic value of oil is apparent. In suitable cases it is preferable to antacids because of its calorific value. In hyperchlorhydria it should precede the meal. In hypochlorhydria it should follow the meal. In stasis and persistent slow evacuation it should be eschewed. In hypermotility it may be given before, during, or after the meal. Oil lowers the gastric secretion both by reflex central inhibitory stimulation and by mechanical action.

W. Bloch (*Archiv f. Verdauungskrankheit.*, xiii, No. 6) reports his experience with nineteen cases of gastric ulcer or pyloric stenosis in which great benefit was derived from small amounts of oil, taken three times a day. It was remarkable, he states, how

rapidly the pain was relieved and the debilitated patients gained strength. This was most evident in cases of enlargement of the stomach from spasm of the pylorus. All were out-patients and some continued at work throughout the treatment. In private practice he prefers oil of sweet almonds, changing in two weeks to an emulsion of pulverized sweet almonds. In winter he prefers an emulsion, made with or without belladonna, according to the following formula:

R. Tincturæ belladonnæ foliorum, fl ʒi (4.0 c.c.);
 Olei amygdalæ dulc., fl ʒi (30.0 c.c.);
 Vitelli ovi unius;
 Aquæ destillatæ, ad fl ʒvi (200.0 c.c.).

M.—Ft. emulsio.

Sig. A tablespoonful three times a day.

The proportion of oil may be increased or decreased according to the severity of the case. In some instances Bloch gives pure olive oil or linseed oil.

L. Rüttimeyer (*Correspondenz-Blatt f. schweiz. Aerzte*, 1908, xxxviii, No. 21) reviews the history of systematic treatment of stomach affections with oil, and describes his own experience in 100 cases. In some cases of hypersecretion, with or without neurasthenia, the secretion was reduced when 30 grams of butter or 100 grams of olive oil were taken fasting in the morning. The most striking benefit of the oil treatment, he remarks, is its influence on the subjective disturbances. The oil banishes the pain and restores the earning capacity, even though the objective findings may occasionally persist unmodified.

Dysentery.—Coyne and Auché (*Rev. de Méd.*, Dec. 10, 1907) have prepared a *polyvalent serum* by means of the bacilli of the Flexner and Shiga group for the treatment of cases of bacillary dysentery. This serum showed distinct curative and preventive action in rabbits, and gave indisputably good results in twenty-four cases of dysentery in infants. The dose was 10 to 20 c.c., subcutaneously, according to the age of the child and the severity of the attack.

Raymond (*Military Surgeon*, 1908, xii) writes enthusiastically concerning the use of *ipécac* in amœbic dysentery. He gives full details of his treatment, which, in addition to rest in bed, prelimi-

nary opening of the bowels by a saline, fluid diet, and general careful nursing, consists in the administration of 30 drops (1.8 c.c.) of tincture of opium followed in twenty minutes by 6 gelatin capsules, each containing 5 grains (0.3 Gm.) of ipecac. These should be swallowed with as little water as possible, and the patient is enjoined to lie perfectly still, and an ice-bag is applied to the throat. If the advised precautions are carried out, no emesis is likely to ensue. The ipecac is repeated on the following day and the next, and then all medication is stopped except the administration of 15 grains (1.0 Gm.) of ipecac, preceded by 20 drops (1.2 c.c.) of tincture of opium, each evening for the next four days. The ipecac is diminished then to 5 grains (0.3 Gm.) for two or three days, when the amœbæ may be considered to be eliminated from the system and the process of repair inaugurated.

W. E. Deeks (*Medical Record*, Dec. 12, 1908) describes a method of treatment for amœbic dysentery, which has given brilliant results. The patient is put to bed, absolute rest is enjoined, a purely milk diet is given, and when great tenesmus is present, warm saline irrigations two or three times daily. A preliminary dose of castor oil is usually advisable. The only internal medication consists in the administration of very large doses of *bismuth subnitrate*, from 1 dram (4.0 Gm.) to 1½ drams (6.0 Gm.) every three hours. In milder cases improvement begins in from three to five days; in severe cases in from ten to fourteen days; and in from one to three weeks from twelve to twenty-four hours are passed without a movement. The diet is then gradually increased and the dosage of bismuth lessened.

Diseases of the Nervous System

Chorea.—Chorea minor, Koplik (*Med. Record*, Jan. 18, 1908) asserts, must be recognized as a self-limited disease and everything avoided that can tend to exacerbate symptoms. Modified rest cure is advisable in the mildest cases, and it is unwise to give increasing doses of Fowler's solution. A sedative is more to the purpose, sulphomethylmethane (trional), five grains three times daily, being recommended. For moderately severe cases rest in bed without complete isolation is important, and no arsenic should be given if there is cardiac involvement. Sodium salicylate may be useful, but

if badly borne no drug beyond a sedative should be given and no digitalis. Strychnine as a bitter tonic has proved useful. Hydrotherapy is of service. In the severest forms in which speech is lost, the use of arsenic is fraught with danger; the sides of the bed should be padded. In short, Koplik considers the use of arsenic in this disease futile and surrounded with danger. Isolation and darkened rooms Koplik disapproves of, as children do better for the agreeable quiet companionship of others. They need sunlight and air besides.

G. Rankin (*Brit. Med. Jour.*, Sept. 12, 1908), on the other hand, while recognizing that there is no specific for chorea, believes that the best results are obtained with arsenic in gradually increasing doses. To check the incessant movements and prevent exhaustion he relies on chloral hydrate. Cold douches or ice-bags to the spine are worthy of trial in extreme cases.

G. Marinesco (*Semaine Méd.*, 1908, xxviii, No. 47) reports four cases of severe chorea in young girls between twelve and twenty-two years of age in which the symptoms rapidly subsided under one or two intraspinal injections of 3.5 c.c. of a 25 per cent. solution of magnesium sulphate. Only slight and transient by-effects were noted. He thinks that this treatment may be found effectual also in major chorea and in the chorea of pregnant women.

Tetany.—W. G. MacCallum and C. Voegtlin (*Johns Hopkins Hospital Bulletin*, 1908, xix), from a study of calcium metabolism in animals in which tetany is produced by parathyroidectomy, conclude that all the violent symptoms caused by the operation may be almost instantly cured by the intravenous injection of a calcium salt (5 per cent. of the acetate or lactate of calcium). Subcutaneous injection or taking the salt by the mouth is as effective, but acts more slowly. Potassium salts have an opposite effect. The authors believe that the administration of calcium salts may have some therapeutic importance, not only in postoperative tetany, but also in those forms occurring spontaneously, as in children and in some infectious diseases, or in pregnancy and lactation.

Neuralgia.—O. Kiliani (*Medical Record*, Jan. 18, 1908) analyzes his results in 55 cases of facial neuralgia treated by Schlösser's alcohol injection method. The only surgical accident was a typical paresis of the oculomotor nerve, which lasted about four weeks. Out of the 55 cases he had three failures and one

patient has had a recurrence. The remainder are, so far as he knows, free from pain, and of this fact he is positively sure in the case of forty-seven. Bodine and Keller (*New York Med. Jour.*, Sept. 26, 1908), from their experience with deep injections of alcohol in 15 cases of trigeminal neuralgia, conclude that the treatment is advisable when internal medication has failed, and by all means should precede the consideration of surgical interference. Ostwalt (*Bull. de l'Acad. de Méd.*, 1908, lxxii, No. 16) and Sicard (*Presse Médicale*, 1908, xvi, No. 37) also speak favorably of alcohol injections in neuralgia.

S. Gordan (*New York Med. Jour.*, June 13, 1908) injects pure *chloroform* (2 to 10 minims) into the site of the neuralgic area with an ordinary hypodermic syringe, with aseptic precautions. He quotes good results in facial neuralgia, torticollis, brachial neuralgia, lumbago, coccygodynia, plantar neuralgia, etc. He concludes that this treatment is the nearest approach to a specific that we have in neuralgia.

Epilepsy.—Spratling (*Albany Medical Annals*, 1908, xxix, 172) contends that the *bromides* have contributed nothing to the curability of epilepsy. If they are used at all they should not be given in doses to exceed 15 to 20 grains (1.0–1.3 Gm.) daily, and these amounts should be increased so slowly that bromism will not appear. It is unnecessary to cause acne to get the physiologic effects of the drug; 5 grains (0.3 Gm.) three times a day given on scientific principles are of far greater value than 20 grains (1.3 Gm.) at similar intervals given without heed to eliminative precautions.

MEDICINE

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Infectious Diseases

INFLUENZA.—Davis (*Archives of Internal Medicine*, Sept., 1908) has investigated the *bacteriology of clinical influenza* and influenzal pneumonia. Certain epidemics of clinical influenza seem to be due to other micro-organisms than the influenza bacillus, viz., the pneumococcus, streptococcus, micrococcus catarrhalis, and in one case examined by Davis to a micro-organism culturally identical with the meningococcus. The complications following an attack of influenza may be very severe and are often due to the above-mentioned micro-organisms. The influenza bacillus is frequently found in so-called influenzal pneumonia, but it is not always the primary cause of these cases. It is concluded that other micro-organisms often cause clinical influenza and influenzal pneumonia. The influenza bacillus may be the primary or secondary invader in these cases.

Cohoe (*Amer. Jour. Med. Sciences*, Jan., 1909) reports a non-fatal case of *influenzal meningitis* in which the influenza bacillus was cultivated from the cerebrospinal fluid. Clinically, influenzal meningitis cannot be differentiated with certainty from meningitis due to the meningococcus or pneumococcus.

TETANUS.—Theobald Smith (*Jour. Amer. Med. Assoc.*, March 21, 1908) calls attention to some neglected facts in the *biology of the tetanus bacillus* and their bearings on the safety of biologic products. He found that under certain conditions of cultivation some tetanus spores survive a single boiling or steaming of 20 and occasionally even of 80 minutes duration. The finding of the tetanus bacillus in gelatin and the danger of infection re-

sulting from the subcutaneous use of gelatin in the treatment of hemorrhage are mentioned.

The resistance of tetanus spores to destruction is of even greater interest to the surgeon and physician, as they do not always have at hand high-pressure autoclaves and often depend upon a single boiling in an alkaline solution for the sterilization of surgical supplies.

As a result of Fourth of July injuries, 76 cases of tetanus occurred this year in the United States (*Jour. Amer. Med. Assoc.*, Sept. 5, 1908, p. 841, special article). Blank cartridge wounds were the most common mode of entrance of the tetanus bacillus. The mortality of the cases of tetanus was seventy-two per cent. No cases were reported to have developed after prophylactic doses of tetanus antitoxin had been administered.

Valliard (*Bull. de l'Acad. de Med.*, Paris, lxxii, No. 22, p. 581) discusses the 31 cases on record in which tetanus has developed although the patients had previously received prophylactic injections of tetanus antitoxin. The tetanus developed from the tenth to the eighteenth day after the injections of tetanus antitoxin. Valliard concludes that the immunity conferred by one dose of tetanus antitoxin does not last longer than seven or possibly fourteen days. The course of the disease seemed to be milder when it developed in cases that had previously received an immunizing dose of tetanus antitoxin.

The failure of tetanus antitoxin to prevent the development of tetanus may in part be due to inadequate dosage, carelessness in administration, or to the fact shown by Rosenau and Anderson (*Hyg. Lab. Bull.* No. 43) that until recently tetanus antitoxin varied widely in its unit value. This variation has been remedied since they have devised a simple method of standardizing tetanus antitoxin. In this connection it is well to bear in mind that biologic products used in veterinary medicine are not required to conform to the standards of the United States Public Health Service.

Brandenstein (*Deut. Zeit. f. Chir.*, xcii, No. 1) considers that after tetanus has once developed, injections of antitoxin are useless. On the other hand prophylactic injections of tetanus antitoxin are of the greatest value.

PELLAGRA.—A number of cases of pellagra have been reported

from the Southern States during the past few months, and the disease seems to be endemic in this region, although it has not been previously recognized. The disease is of great frequency in Europe. It is stated that in Roumania 50,000 and in Italy 100,000 persons are affected with pellagra. Cases have been reported from the insane asylums of Alabama and South Carolina and isolated cases from other areas in the Southern States. Lavinder (*Jour. Amer. Med. Assoc.*, Oct. 24, 1908) states that the American cases are relatively of an acute form and that the mortality is higher than in the European cases. The disease is attributed to the use of maize that is infected with the fungus that causes the "smut" of corn. The exact causative factor has not been clearly demonstrated. Samborn considers that pellagra may possibly be due to a protozoan infection.

R. H. Bellamy (*Jour. Amer. Med. Assoc.*, Aug. 1, 1908, p. 397) reports three chronic and seven acute cases of pellagra. In the acute cases the disease begins with epigastric pain, nausea, vomiting, stomatitis, and diarrhoea with dysentery-like stools. Emaciation, erythema, and delirium follow, and death often occurs within ten days to six weeks. The chronic cases are characterized by stomatitis, erythema, and mental symptoms. The attack usually begins in the spring with nausea and diarrhoea. Ten days to two weeks later an erythema develops on the surface of the body. The eruption somewhat resembles a sunburn, and appears on the portion of the body most exposed to the effect of the sun's rays. The disease abates during the winter but recurs during the following spring and often lasts from five to fifteen years. The etiological rôle attributed to maize in pellagra has a close analogy to that which some authors assign to rice in beriberi.

Searcy (*New Orleans Med. and Surg. Jour.*, Dec., 1908) has continued his study of pellagra and is now convinced that the disease prevails in all parts of the South. Cases have not been reported from the Northern States, although maize is extensively used for food in these States.

ANTHRAX AND GLANDERS.—The importance of being on the alert for possible infections of human beings with anthrax, glanders, and actinomycosis is shown by the frequency with which such cases are being reported. Royer and Holmes (*Penna. Med. Jour.*,

Oct., 1908) report fifteen cases of *cutaneous anthrax* treated in Philadelphia within two and one-half years. The cases occurred in individuals who had handled hair, hides, or infected cattle. The diagnosis was made by the vaccine-like lesions, œdema, and leucocytosis. Bacteriological examinations of the lesions and of the blood revealed the presence of the *Bacillus Mallei* and thus confirms the diagnosis. Excision and cauterization of the lesions, combined with the administration of the anti-anthrax serum prepared in Prof. Selavo's Laboratory at the University of Sienna, is considered as the most satisfactory treatment.

Of special interest in connection with *glanders* is the frequency with which laboratory workers and veterinarians are infected. Bevan and Hamburger (*Jour. Amer. Med. Assoc.*, May 16, 1908) report several cases of glanders in one family and mention that those occurring in human beings are rarely correctly diagnosed. The "mallein" and the "agglutination" tests are not often used in the diagnosis of cases occurring in human beings. A number of instances are reported in which laboratory workers have been infected with glanders while handling cultures of the *Bacillus Mallei*. Meyer and Crohn (*ibid.*) state that nine cases of human glanders have been reported to the New York Board of Health during the past two years.

Typhoid Fever

The contributions to the literature of typhoid fever during the past year consist principally of reports of outbreaks of typhoid fever. Particular activity has been shown in tracing the cause of these outbreaks to infection by water, milk, flies, and contact.

Anderson (*The Medical Record*, Nov. 28, 1908) gives some general facts of importance in the *differentiation of outbreaks of typhoid fever* when transmitted by one of the above causes.

The outbreaks of typhoid fever due to infection through contaminated water occur suddenly. The cases are distributed through the area supplied by the water from a certain reservoir or cistern; and persons not using the suspected water are free from the disease. The outbreak is apt to appear in the spring or late winter and may have followed a change in the water supply. The source of infection may be found in the watershed. Chemical and bacteriological examinations of the water reveal evidence of pollution.

The infection from milk usually causes a sudden outbreak of an unusual number of cases followed by a rapid decline. The cases occur among persons that use milk, and of these persons, only those using milk from a certain dairy are affected. More cases occur among the well-to-do people than among the poor. The cause is proved by the finding of the bacillus in the milk.

Outbreaks due to contact are local and can usually be traced to the careless nursing of typhoid fever cases. Cases resulting from the transmission of infection by flies occur during the warm season and in places where the sanitary precautions are poor.

Harrington (*Boston Med. and Surg. Jour.*, July 2, 1908) reports the occurrence of 410 cases of typhoid fever due to infection from the use of contaminated milk. The epidemic was traced to the milk supplied by two milkmen. The dairies were found to be free from infection, but one of the milkmen who handled the milk was suffering from typhoid fever, and subsequently died of the disease. The presence of the infection in the milk supplied by the second milkman was explained by the interchange of milk vessels previously used by the infected milkman. A number of other epidemics from infected milk were reported during the year. The epidemic that occurred in Georgetown is of interest (*Hyg. Bull.* No. 41). Seventy-six cases of typhoid fever were traced to infected milk obtained from one dairy farm. A systematic examination of the dairies did not reveal the source of the infection. The employees at the dairies were next examined, and one woman was found to be a chronic typhoid bacillus carrier. The milk had become contaminated from this woman's working as a milker in the dairy.

A number of reports of *typhoid bacillus carriers* have appeared during the past year. W. H. Park (*Jour. Amer. Med. Assoc.*, Sept. 19, 1908, p. 981) considers it now definitely established that a certain number, fully two per cent. of the persons who have had typhoid fever, become typhoid bacillus carriers. There are in addition to this group of carriers a number of individuals who have never knowingly had typhoid fever (cited by Park at 1 in 500) that are typhoid bacillus carriers. The question of what to do with individuals who are typhoid bacillus carriers is considered. Their large number would seem to render it impossible to isolate and

treat them until they are free of typhoid bacilli, even if a satisfactory method of treating the cases was known. The only plan that seems reasonable at present is to safeguard our food and water supplies constantly against infection with typhoid bacilli.

Rosenau (*Jour. Amer. Med. Assoc.*, Sept. 19, 1908) considers that it is possible that the typhoid bacillus may take up a natural habitat somewhere in the intestinal tract independent of the gall-bladder. Therefore the suggested operative measures directed against the gall-bladder would not always remove the source of infection in typhoid bacillus carriers. So far no practical method has been devised of permanently freeing the human intestinal tract of typhoid bacilli.

Vaughan (*Amer. Jour. of Med. Sciences*, Sept. 1908, p. 330) in discussing the specific treatment of typhoid fever with the proteid residue of typhoid bacilli concludes that the residue may be of some use in preventing relapses.

METABOLISM IN TYPHOID FEVER.—Previous investigators have shown that there is a marked loss of body protein during an attack of typhoid fever. Leyden and Klemperer (cited by Warren and Coleman) have reported a case of typhoid fever in which there was a loss of 109 grammes of nitrogen, the equivalent of 3.2 kilos of muscle tissue, in seven days. Ewing (cited by Warren and Coleman) is of the opinion that some of the phenomena of typhoid fever result from autointoxication due to the destruction of such a large quantity of body protein. The loss of protein is the result of undernutrition, pyrexia, and the action of the toxins. Warren and Coleman (*Jour. Amer. Med. Assoc.*, Sept. 19, 1908, p. 974) have attempted by dietetic measures to retard this loss of body protein. They placed patients on a diet composed of large quantities of carbohydrates and found it possible to lessen the loss of body nitrogen, but in order to do so a diet yielding from 3000 to 4000 calories per diem was necessary. The use of such liberal feeding in typhoid fever is open to many objections.

THE OCULAR TYPHOID REACTION.—Chantemesse has previously described the *ophthalmodiagnostic test for typhoid fever*. The material used for the test is obtained by the precipitation of an extract of typhoid bacilli with alcohol.

Hamburger (*Jour. Amer. Med. Assoc.*, April 25, 1908) has

tried a modification of the ophthalmodiagnostic test. He used an unprecipitated extract of typhoid bacilli. One drop of the extract when instilled into the eye of a typhoid patient produced a reactive inflammation. In non-typical affections and normal individuals a less intense and shorter reaction was produced when the extract was instilled. The occurrence of this less intense reaction in non-typhoid cases seriously impairs the value of the test.

Bubonic Plague

The present pandemic of plague began in 1894 and has since spread to fifty-two countries. Blue (*Jour. Amer. Med. Assoc.*, Feb. 1, 1908) describes the methods and principal factors of the plague fight that was waged in California. The disease may be transmitted from man to man and the respiratory cases are especially contagious, but the epidemics are kept alive by infected animals, especially rats. The prophylactic measures are directed against the extermination of the rats, the prevention of their entering human habitations, and keeping watch that infected rats are not brought into non-infected communities. Danyasz's bacillus can be used with success in the destruction of rats, but it rapidly deteriorates and fresh virulent virus has to be distributed frequently. Rats may carry other infections than plague. Of the rats examined in San Francisco, 34 per cent. were infected with tapeworms, 25 per cent. with trypanosomes, and 65 per cent. with nematodes and the *Tricocephalus dispar*. The flea is an important factor in the transmission of the plague among rats, but when the rat host is destroyed the rôle of the flea is lessened. Verjbitski (*Journal of Hygiene*, London, May, 1908) states that the rat flea does not bite human beings; but the human flea bites both rats and human beings and may transmit the disease. Strong (*Jour. Med. Research*, May, 1908, p. 325) reaches the conclusion that satisfactory immunity to plague at the present time cannot be obtained except by inoculation with properly attenuated living plague bacilli. If it were possible the use of dead cultures of plague bacilli would be preferable, because there would be less danger of accidental transmission of the disease.

Anaphylaxis

This strange phenomenon has continued to interest serologists. Rosenau and Anderson (*Hyg. Lab. Bull.* No. 45, 1908; and No. 36, 1907) have recently reported further studies upon the subject. In guinea-pigs the period of incubation of serum anaphylaxis is seven days when the animals are sensitized by the brain and nine days when they are sensitized subcutaneously. The period of incubation seems to be quite constant and not appreciably prolonged by large sensitizing doses. The susceptibility lasts for a long time, 245 days or longer. The sensitizing and toxic principles of protein are destroyed by heating to 100° C. The toxicity of horse serum does not appear to diminish with age and no chemicals were found to materially lessen its effect. Anaphylaxis is specific in nature. Guinea-pigs sensitized to human milk do not react to cows' milk. Guinea-pigs may be sensitized to three or more separate proteins, viz., egg white, horse serum, and cows' milk. A substance called anaphylactin is present in the blood-serum of immune and sensitized guinea-pigs.

Cases of sudden death in man following the administration of horse serum are not due to the unusually high toxicity of the horse serum used, but to the fact that the individual is unusually sensitive to the foreign proteid. It has not yet been demonstrated in what way man becomes sensitized to a foreign proteid.

Wells (*Jour. Inf. Diseases*, Oct., 1908) states that egg white sensitizes guinea-pigs in doses as small as one twenty-millionth of a gramme and sensitizes fatally in doses of one-millionth of a gramme. The minimum fatal dose for sensitized guinea-pigs was found to be from one-tenth to one-twentieth of a milligramme when injected into the blood, and one-half a milligramme when injected intraperitoneally.

From Lewis's (*Jour. Exper. Med.*, 1908, vol. x, No. 5, p. 608) experiments it seems that when it is introduced subcutaneously from five to six c.c. of serum are required to kill a guinea-pig. One may therefore infer that unless the second dose of serum enters a vein quite a large quantity would be required in order to cause a fatal result in man. Lewis cautions against unreservedly applying the facts learned from animal experimentation in regard to anaphylaxis to the interpretation of the possible results that may occur from the use of serum in man.

Tuberculosis

THE OCULAR AND CUTANEOUS TUBERCULIN TESTS.—Wolff-Eisner ("Ophthalmo und Kutan Diagnose der Tuberculose," Würz., 1908) bases his discussion of the significance of the ocular tuberculin reaction on four thousand clinical observations. The conclusion is reached that a positive reaction with his method of using the test indicates an active tuberculous lesion, and that the subcutaneous and cutaneous methods are less valuable because they react to both latent and active foci.

On the basis that the immunity to absorbable toxins differs from the immunity to the tubercle bacillus, he attempts to explain certain cases that at first react to small subcutaneous doses, 1 to 5 mg. of tuberculin, but subsequently fail to react to larger doses except by the violent starting up of a previous cutaneous test. The immunity to the tubercle bacilli is considered a bacteriolytic property. The immunity to toxin results from the binding of the toxins by receptors. The receptors are often found in the connective tissue and the tuberculin is bound at these points and thus causes a local reaction. These points of accumulated receptors may be due to disease foci or may be produced artificially, and Wolff-Eisner suggests the utilization of this fact in the therapeutic treatment of tuberculosis.

IMMUNITY IN TUBERCULOSIS.—E. R. Baldwin (*Amer. Jour. Med. Sciences*, Jan., 1909) discusses the problem of immunity in tuberculosis. The principle of immunization with bacteria of attenuated virulence holds the leading place in the hope for successful results in the future treatment of tuberculosis. The soluble extracts of the tubercle bacilli have failed to protect animals against tuberculosis. Tuberculin residue and bacillen-emulsion are only protective to a certain degree. It has been found that the immunity produced in cattle after injections of human tubercle bacilli only lasts for a variable period, six months to two years. At present it seems that no long-continued immunity can be produced in man or cattle by any of the known methods of immunization. The facts seem established that living bacteria are superior to all preparations of dead bacilli for protective inoculation, and that the degree of immunity against tuberculosis seems directly proportional to the virulence of the vaccine. The agglutination and opsonin tests

are not considered certain methods of measuring the resistance of the organism. There is no safe method of determining with certainty when the hypersensitive stage is being reached, in administering tuberculin, although it seems best to avoid artificially induced hypersensitiveness. The possibility of producing passive immunity against tuberculosis should not be considered hopeless, although serum therapy furnishes but a faint probability of success.

Diseases of the Circulatory System

CARDIAC ARRHYTHMIA.—NORRIS (*Amer. Jour. Med. Sc.*, July, 1908) has discussed the subject of *cardiac arrhythmia* from a practical standpoint in the light of recent investigations. The types of pulse irregularity may be divided into: juvenile arrhythmia, extrasystole, perpetual arrhythmia, heart block, and depression of contractility.

The respiratory type of cardiac arrhythmia called "juvenile" or "infantile" arrhythmia, is of nervous origin. The remaining forms of cardiac arrhythmia are usually due to affections of the cardiac muscle and are therefore of more serious prognostic import. The respiratory type of arrhythmia is due to an exaggeration of the normal vagus reflex that causes inspiration to increase and expiration to decrease the pulse-rate. Müller (*Archives of Internal Medicine*, Jan., 1908) suggests that "changing pulse-rate" would be a more appropriate term. Respiratory cardiac arrhythmia consists of a true intermission of a pulse-beat and indicates an unstable equilibrium of the vagus centre. This change in pulse-rate may occur in children, neurasthenics, and persons convalescing from infectious diseases. Peters (cited by Norris) has observed that the majority of cardiac arrhythmias which occur late in the course of diphtheria and scarlet fever are of this type, and it is of prognostic value to know that they are of nervous origin and not due to grave myocardial lesions. Juvenile arrhythmia is pathological only when marked pulse irregularity occurs during quiet breathing.

Extrasystole is a term applied to premature contractions of the auricle or ventricle in response to a stimulus from some other than the normal portion of the heart; otherwise the fundamental rhythm of the heart is maintained (Mackenzie). The abnormal stimulus

usually arises from irritation of the cardiac muscle, especially the ventricle. It causes a contraction of the cardiac muscle before the contractile force and quantity of blood in the cavity is sufficient to force open the aortic valves and cause a pulse wave. These extrasystoles produce a secondary refractory period at the time when a normal stimulus occurs and a beat is thus lost. Extrasystoles may be auricular, ventricular, or auriculo-ventricular in origin. Clinically they cause two or more approximating beats and on auscultation a muffled third sound may sometimes be heard during diastole. Thayer (*Trans. Assoc. of Amer. Physicians*, 1908) states that it is not unusual to hear over the normal heart in early diastole a third sound probably due to sudden tension of the mitral and tricuspid valves from the first onrush of the blood-stream. The condition of extrasystole may result from neurotic, toxic, and physiologic conditions, or from organic affections of the cardiac muscle or vessels. There is some difference of opinion as to the prognostic significance of extrasystole, but it is generally accepted that this should be regarded as a sign of possible severe affection of the heart. Müller doubts if extrasystoles are ever of purely nervous origin. Even in young people they may be due to a sudden rise of blood-pressure and may indicate a beginning degeneration of the heart muscle. Wenckebach (cited by Norris) concludes that too much significance should not be attached to extrasystoles in themselves, yet they necessitate a careful search for a cardiac lesion or other cause.

Perpetual arrhythmia is a condition in which no regular rhythm of the pulse can be made out for long periods of time. It is usually associated with a positive venous pulse, and has been attributed to a block between the sinus and auricles. The permanently irregular pulse is never entirely of nervous origin and usually indicates serious damage to the heart muscle.

HEART BLOCK.—Reports of typical cases of the Stokes-Adams syndrome continue to appear in medical literature. James (*Amer. Jour. Med. Sc.*, Oct., 1908) reports an unusual case of acute complete heart block from a destructive lesion (ulcer) involving the atrioventricular bundle. The case was complicated by an acute malignant endocarditis. Although there was involvement of the "bundle of His" the case did not show either syncopal or epileptoid seizures.

A second case of James's showed a typical Stokes-Adams syndrome, bradycardia, pulse-rate thirty, visible and palpable pulsations in the jugular vein, cerebral seizures, etc. In this case there were good reasons to believe that the conductivity of the "bundle of His" was at all times perfect and that the condition was one of extrasystole. James concludes that complete heart block can occur without the Stokes-Adams syndrome, and on the other hand that the Stokes-Adams syndrome may exist in the presence of perfect atrioventricular conduction. A closely allied syndrome consisting of tachycardia in mitral and tricuspid regurgitation, associated with syncope and epileptiform seizures, is described. In both cases many systoles are lost through there being insufficient muscular force to cause the opening of the aortic valves.

In the prognosis of cardiac affections many other factors must be taken into consideration, otherwise serious errors will occur.

Müller (*Archives of Int. Med.*, Jan., 1908) gives a careful review of the nervous affections of the heart and the principles that aid in their differentiation from organic cardiac diseases. The nervous heart is usually associated with excessive irritability of the nervous system, and is seen in neurasthenia and other functional disturbances of the nervous system. The heart reacts easily and excessively to drugs and excitement, mental, physical, and emotional, or to other conditions that cause variations in the pulse-rate. The rate of the pulse is frequently more rapid than normal, but at times it is normal, and occasionally it is slower than normal.

Exophthalmic goitre, various toxins, and sexual conditions cause affections of the heart that must be excluded before a diagnosis of a nervous affection of the heart can be made. The nervous heart is not usually enlarged; cardiac pain is usually less severe, more prolonged, and shows less relation to overexertion. If pain occurs in nervous affections of the heart it is more superficial and there is less radiation. With the cardiac rapidity there are no signs of failing circulation, and exercise may improve the pulse-rate. Paroxysmal tachycardia is considered to be a distinct nervous affection and differs from simple cardiac palpitation. The latter seems to result from a peculiar form of muscular contraction in which the maximum systole is reached too quickly for the effective propulsion of the blood into the vessels.

The blood-pressure in nervous affections of the heart is characterized by its variability. A constant high pressure is often an indication of a beginning arteriosclerosis, and the marked variations in pressure that occur in nervous affections of the heart seem to predispose to the development of arteriosclerosis.

Diseases of the Ductless Glands

The study of the ductless glands in some respects becomes more complex as increasing knowledge is obtained of their functions. Many recently discovered facts seem to indicate that the ductless glands and organs producing internal secretions are in some ways interdependent; this applies to the thyroid, parathyroids, adrenals, pancreas, pituitary body, the liver, and perhaps to other organs. Many investigations of the relation of the internal secretions of the various glands and their influence on metabolism have been made during the past year.

Hoffmann (*Münch med. Wochen.*, 1908, lv, No. 6) believes that the internal secretions of other ductless glands have an important influence on the symptoms that occur in excessive and deficient secretion of the thyroid gland. The thyroid and adrenals seem to be antagonistic in their actions, the thyroid acting through the vagus and the adrenals through the sympathetic system. Certain glands to a limited extent at least seem to be able to take on the function of other glands, and thus aid in carrying on normal metabolic processes. In exophthalmic goitre there may be associated with excessive thyroid secretion a diminished activity of the antagonistic adrenal glands, and these changes may cause an increase of the symptoms. On the contrary in myxœdema there may be a relative hyperfunction of the suprarenals and a deficient thyroid secretion.

THE PARATHYROID GLANDS.—The parathyroid glands have attracted additional interest since it has been shown that many of the nervous symptoms formerly attributed to removal of the thyroid glands are the result of coincident interference with the blood-supply of the parathyroid glands. In the condition of tetany that develops following the removal of the parathyroid glands, there is increased elimination of calcium salts. MacCallum and Voegtlin (*Johns Hopkins Hosp. Bull.*, No. 19, p. 91, 1908) have

found that the intravenous injection of a 5 per cent. solution of calcium acetate or lactate causes almost instant cessation of the tremor, tachycardia, rigidity, and other symptoms resulting from parathyroidectomy. These findings harmonize with Escherich's observation of the pathological changes in the parathyroid glands of children who had previously exhibited a tendency to tetany. Chvostek (*Wien. klin. Wochen.*, 1908, xxi, No. 2, p. 37) has advanced the theory that excessive or perverted function of the parathyroids may be an etiological factor in myasthenia gravis. Carter (*Texas State Jour. of Med.*, Jan., 1908) from experimental studies concludes that the parathyroids are more essential to life than the thyroids.

Thompson and Leighton (*Jour. Med. Research*, July, 1908) have shown that the symptoms resulting from gradual destruction of the parathyroids differ from those obtained from the excision of the glands. After ligation of the parathyroid vessels there is slow progressive loss of weight and strength, with stupor, and finally death from exhaustion without the symptoms of tetany. The conclusion is reached that sudden loss of the parathyroids results in an acute convulsive condition (tetany); but a slow destruction causes chronic nutritional disturbances and death without symptoms of tetany.

THE THYROID GLAND.—The relation of the iodine content to the structure of the thyroid gland has been investigated by Marine and Williams (*Arch. of Int. Med.*, May, 1908). Iodine is considered necessary for normal thyroid activity. The percentage of iodine varies with the amount of colloid in the hyperplasia. The ability of the thyroid to store iodine depends on the degree of glandular hyperplasia rather than upon the mode of administration of the iodine. Reid Hunt and Seidell (*Jour. Amer. Med. Assoc.*, Oct. 24, 1908) have shown that there is a parallelism between the iodine percentage and the physiological activity of the thyroid gland.

Krause and Fridenthal (*Berl. klin. Wochen.*, xlv, No. 38, p. 1709) have made an experimental study of the action of thyroid substance and adrenalin that confirms the antagonistic action of these substances. This antagonism has been previously mentioned in Hoffmann's article (*loc. cit.*).

EXOPTHALMIC GOITRE.—Stengel (*New York Med. Jour.*, Sept. 25, 1908) in a consideration of exophthalmic goitre from a medical standpoint gives the following types of the affection. The first series of cases show moderate enlargement of the thyroid gland with mild symptoms of hyperthyroidism and occur in certain constitutional, circulatory, or nervous conditions. These cases usually recover. The second class of cases includes patients with typical hyperthyroidism associated with fixed organic changes in the thyroid gland. These cases may or may not recover under medical or surgical treatment. The third group of cases are those of long-standing goitre or other thyroidal disease, in which the symptoms of exophthalmic goitre supervene. These cases usually require surgical treatment.

Wilson (*Amer. Jour. Med. Sciences*, Dec., 1908) has studied the relation of the pathological changes in the thyroid gland to the varying symptoms of Graves's disease. The severity of the symptoms in Graves's disease seems to be directly proportional to the amount of thyroid secretion absorbed from the glandular alveoli. The symptoms of Graves's disease are associated with increased absorption of excessive secretion of the thyroid gland. The greater the glandular hyperplasia of the thyroid the larger the amount of the secretion, and the more fluid the secretion the more readily it is absorbed. Hypothetically Graves's disease develops as the result of some irritant acting on the thyroid parenchyma; the parenchyma proliferates, over-functionates, and finally degenerates. The severity of the symptoms depends on the amount of absorbable secretion and the patient's ability to neutralize the same. Patients may recover from toxic symptoms, but continue to suffer from acquired heart or nerve lesions. The above conclusions are based on the clinical study of 294 cases of thyroid affection.

THE FUNCTION OF THE THYMUS GLAND AND ITS RELATION TO EXOPHTHALMIC GOITRE.—MacLennan (*Glasgow Med. Jour.*, 1908, lxx, p. 97) has investigated the function of the thymus gland. The conclusion is reached that though the thymus be a lymph-gland yet it is so specialized that it must have an internal secretion of more or less importance to some of the functions of the human body. Its function may be taken on by other organs. The thymus is unnecessary to the general economy when the thyroid

is removed, and conversely when the thymus is removed less thyroid secretion is needed. In cretinism for this reason, removal of the thymus may possibly be beneficial. The simultaneous removal of the thymus and spleen always results in sudden death.

In the cases of sudden death in exophthalmic goitre following thyroidectomy Capelle (*Münch. med. Wochens.*, lv, No. 35) has found at autopsy that the thymus is enlarged. He considers it of the greatest importance to attempt to determine if the thymus is enlarged before operating in cases of exophthalmic goitre. A large thymus usually means a weak heart that may not withstand the after-effects of an operation. Unfortunately the clinical recognition of an enlarged thymus is difficult. Dulness over the upper portion of the sternum and a Röntgen ray shadow, with evidences of the lymphatic temperament, are about the only clinical signs to even suggest thymic enlargement.

THE CHEMICAL CONTROLS OF THE HUMAN BODY.—Starling (*Jour. Amer. Med. Assoc.*, March 14, 1908) in his address on this subject points out that drugs as we use them at present are but a crude imitation of the methods employed by nature in the wonderful co-ordination of the activities of different parts of the body that is brought about by the production and circulation of chemical substances. We will mention first one of the most interesting examples of chemical co-ordination, viz., the stimulating effect on the activity of the pancreas that is caused by the entrance of dilute acid into the duodenum. This action was at first attributed to reflex nervous influences, but nerve after nerve was severed and the control continued until at last it was found that it was due to a chemical substance discharged into the blood-stream and this "hormone" or chemical messenger proved to be secretin, a true chemical substance, not a ferment or protein. It is a substance that resists heat, dialyzes quickly, and oxidizes with rapidity, and can be taken as the type of the chemical messengers which are formed in one organ and travel in the blood-stream to other organs and thus affect their activities. Throughout the entire process of digestion and even of absorption by the intestinal epithelium there seems to be a series of these correlated chemical controls or "hormones."

Recently Zuelker (*Berl. klin. Wochens.*, xlv, No. 46) claims that

he has isolated the hormone from the stomach mucosa which acts specifically in stimulating intestinal peristalsis. It occurs in the gastric mucosa only during the height of digestion. When injected into the blood of rabbits it causes peristaltic waves to run from the duodenum to the rectum.

A second simple chemical control is seen in the regulation of the respiratory movement. Haldane has shown that a rise of one-half per cent. in tension of carbon dioxide in the alveolar air, and therefore in the circulating blood to the respiratory centre will increase the volume of respired air 100 per cent.

A third chemical messenger is adrenalin, a substance derived from the medulla of the adrenal glands. The adrenals are genetically an outgrowth of the sympathetic nervous system. The action of adrenalin is apparently due to the stimulating effects brought about through the sympathetic nervous system.

We know but little of many chemical controls, such as the pancreatic influence on carbohydrate metabolism and pancreatic diabetes. From the pituitary body Schafer has extracted a substance which seems to produce diuresis by its specific action on the secretory action of the kidneys. The increased activity of chemical changes after the ingestion of thyroid substance is well known; and this thyroid substance does not seem to belong to the proteid class, as it is not destroyed by gastric juice. We may also mention the chemical correlation shown by various organs, as the thyroid, pancreas, and adrenals. One of the difficulties in the efforts of the therapist to imitate nature and control functions by organotherapy is that the chemical substances are supplied by nature to the system in small continuous doses and so far therapeutists have only been able to supply them intermittently. Organotherapy requires a more thorough study of the rôle of the hormones in the body, and their isolation in suitable form for therapeutic use.

Pemberton and Sweet (*Arch. of Int. Med.*, vol. i, p. 628, Feb., 1908) have found that in dogs the injection of extracts of adrenal glands and of the nervous portion of the pituitary body inhibits the flow of the pancreatic juice artificially excited by secretin. The extracts raise blood-pressure, but the inhibitory action is not due to this factor. Extract of brain, liver, and certain drugs had no effect on the secretion of the pancreatic juice.

Eppinger, Falta and Rudinger (*Ztschr. f. klin. Med.*, 1908, lxvi, No. 1, p. 2118) have carried on a number of experiments showing the interaction of the thyroid glands, adrenals, and pancreas. They found that removal of the thyroid gland increases pancreatic activity and decreases nitrogen excretion. The injection of adrenalin lessens pancreatic activity and causes glycosuria. In thyroidectomized dogs adrenalin injections do not cause glycosuria unless the dogs were at the same time fed on thyroid extract. In dogs in which the pancreas had been removed, adrenalin injections greatly increase the excretion of sugar and nitrogen. Simultaneous removal of the thyroid and pancreas causes a decrease of nitrogen and sugar output after several days. The results of the above investigation seem to show the following facts. The thyroid exerts an inhibitory action on the pancreas. The removal of the thyroid causes a condition of "hyperpancreatism." Excessive action of the thyroid lessens pancreatic activity and increases adrenalin activity. The secretion of the adrenals seems to have a great inhibitory action on the pancreas and apparently increases the activity of the thyroids (contrary to Hoffmann's views). *Vice versa*, the secretion of the pancreas inhibits the action of both adrenals and thyroid. These actions seem to be brought about in some way through the sympathetic nervous system.

Diseases of the Digestive System

DISEASES OF THE STOMACH.—*Recent Contributions to the Physiology of Digestion that are of Clinical Importance.*—The most important contribution to our knowledge of the physiology of the digestive tract since Pawlow's work on gastric secretion is Cannon's investigations of the factors concerned in the evacuation of the stomach. In a recent article Cannon discusses his work and gives a summary of the theory of the acid control of the pylorus.

The previously accepted idea was that all of the food remained in the stomach for several hours, until thoroughly mixed with the gastric juice before any of it passed into the duodenum. The opening of the pylorus was attributed to the increasing pressure of progressively stronger gastric peristaltic waves. The above idea is not correct. The stomach soon after food is ingested commences to evacuate its contents intermittently into the duodenum. The

process of evacuation continues at irregular intervals, but not with each peristaltic wave, until the stomach is entirely empty. The intermittent opening of the pylorus cannot be due to the increasing pressure of progressively stronger peristaltic waves, as it is shown by X-ray examinations that the gastric peristaltic waves do not become stronger, but remain of about the same intensity as long as any food is left in the stomach.

Cannon shows that two factors are concerned in the evacuation of the stomach. The one is the pressure on the food at the pylorus by the recurring gastric peristaltic waves. The other and variable factor is the action of the pyloric sphincter. The theory of the acid control of the pylorus is as follows: "The pylorus is tonically closed when food is ingested, and remains closed against recurrent pressure. The appearance of acid at the pylorus causes the sphincter to relax. The pressing peristaltic waves now force some of the acid chyme into the duodenum. The acid in the duodenum at once tightens the sphincter against further exit." The same acid also stimulates the flow of alkaline pancreatic juice. Since no inorganic acid is normally present beyond the first few centimetres of the small intestine, and as the acid reaction of the contents in this uppermost region is replaced throughout the rest of the small intestine by practically a neutral reaction, the acid chyme must be neutralized soon after its emergence from the stomach. As neutralization proceeds, the stimulus closing the pylorus is weakened; now the acid in the stomach is able again to relax the sphincter. Again the acid food goes forth and immediately closes the passage behind it, until the duodenal processes have undergone their slower change; and thus repeatedly until the stomach is empty.

The acid control of the pylorus leads us to anticipate the fact that there is a marked difference in the rate of discharge of fat, proteid, and carbohydrate food stuffs from the stomach. Carbohydrates stimulate gastric secretion, but do not unite with the free acid secreted. The free acid quickly reaches the pylorus and the carbohydrates soon begin to leave the stomach. Proteids also excite gastric secretion, but rapidly combine with free acid and thus delay the development of an acid reaction. The initial discharge is thus delayed and proteids remain in the stomach longer

than carbohydrates. Fats make a continuous slow exit from the stomach. Experimentally in animals carbohydrates commence to leave the stomach within ten minutes after ingestion and are rapidly expelled. Proteids are slowly expelled after remaining in the stomach thirty minutes or longer. The difference in the rate of discharge of fats, proteids, and carbohydrates and the effect of the ingestion of acids or alkalies on the acid control of the pylorus, should be of practical value in dietetics. In some pathological conditions of the digestive tract other factors may have much to do with the control of the pylorus.

Recently Cannon (*Amer. Jour. Physiol.*, Nov., 1908) discusses the acid closure of the cardia, and concludes that the cardia is kept closed by the presence of acid in the stomach. Neutralization of the acid leads to regurgitation, which continues until the normal acidity of the stomach is regained.

After the food passes through the pylorus it usually travels at about the rate of one inch per minute and reaches the cæcum in about four hours. A. F. Hertz (*Br. Med. Jour.*, Jan. 25, 1908) has observed that the gurgling sounds heard in the right iliac fossa coincide with the time of arrival of the food at the cæcum. The gurgling may be of some clinical value in determining the time of arrival of the food in the cæcum, but is of no value as a sign of typhoid fever, because in this disease the excessive gurgling is due to the frequent small liquid feedings the patient receives.

The antiperistaltic waves are of interest from a clinical standpoint in the treatment of diseases of the cæcum, etc., by rectal injections, which Hertz considers rational. The antiperistaltic waves commence when the food reaches about the midpoint in the transverse colon. The reversed circulation brings the fluids in close contact with the mucous membrane and thus aids in the absorption of nutritive materials. The time required for food to travel from the cæcum to the hepatic flexure is about one and a half hours. An hour and a half longer is required for it to reach the middle of the colon and an additional hour to arrive at the splenic flexure. These periods of transit are subject to even wider pathological variations than is the time of exit of the food from the stomach.

The previous observations by Grutzner that in animals the

stomach content arranges itself in concentric layers has been confirmed by Prym (*Münch. med. Wochen.*, 1908, lv, No. 2, p. 57). It was also determined that the layers of contents differ in acidity, those nearest the gastric mucosa containing most acid. Strasburger (*Deut. med. Wochen.*, 1908, xxxiv, No. 7, p. 265) calls attention to the possibility of error resulting from this arrangement of the food when Sahli's or Matthieu's tests of stomach function are used. If hydrochloric acid is given after a meal it remains in the middle of the stomach content and not in contact with the gastric mucosa or pepsin, and therefore it is necessary in the therapeutic use of hydrochloric acid to add pepsin in order to obtain the best result. Leo advises the use of larger doses of hydrochloric acid and pepsin with the meal. If it is desired to stimulate the production of bile and pancreatic juices smaller doses of hydrochloric acid should be given during the meal.

It is well to bear in mind that free hydrochloric acid acting upon the duodenal mucous membrane is a powerful stimulant of pancreatic secretion. Wolgemuth (*Berl. klin. Woch.*, 1908, No. 8, p. 389) takes advantage of this fact in the treatment of *pancreatic fistula* and gives large doses of sodium bicarbonate in combination with a strict carbohydrate-free diet. This lessens pancreatic secretion and facilitates the closing of the fistula. Carbohydrates stimulate pancreatic activity directly, indirectly, and psychically.

Taussig and Rush (*Boston Med. Surg. Jour.*, clviii, No. 3, p. 79) after clinical trials conclude that it is impossible by expression to obtain all of the stomach contents after a test meal. An additional quantity can usually be obtained if the patient is made to lie first on his back, then on his right side. The acid content of the two portions was often found to vary and led the writers to question the value of the Ewald-Boas test meal.

THE OCCURRENCE OF PANCREATIC SECRETION IN THE STOMACH CONTENT.—That pancreatic juice and bile sometimes make their way into the stomach has been previously shown by Boas, Pawlow, and others. It is definitely established that ingested fats lessen gastric motility and remain longer in the stomach than do other kinds of food. Boldyreff (*Pfleugers Arch.*, Bd. cxi, Parts I and II) after numerous experiments concludes that when fats are present in the stomach, bile, and pancreatic and intestinal secretions flow from the intestines into the stomach.

Lewinski (*Deut. med. Wochens.*, Sept. 10, 1908, xxxiv, No. 37) reports that he was able in 70 per cent. of 29 test cases that had previously ingested olive oil to detect pancreatic secretion in the stomach. The findings were positive only when the gastric acidity had been neutralized. The absence of trypsin from the stomach content is considered by him as indicative of pancreatic insufficiency or due to mechanical obstruction to the passage of pancreatic secretion into the stomach. Volhard's (cited by Lewinski) pancreatic test is based upon the flowing of pancreatic secretion into the stomach. Two hundred c.c. of oil are introduced into the fasting stomach and 15 minutes later 100 c.c. of the contents are aspirated. The underlying liquid is tested for trypsin by its action on casein in an alkaline medium. Until these investigations receive further confirmation it does not seem wise to attempt to use them in interpreting the clinical findings in gastric and pancreatic conditions.

THE EFFECT OF OILS ON GASTRIC SECRETION.—In the preceding pages we have referred to the fact that fats lessen gastric motility. Cowie and Munson (*Arch. of Int. Med.*, Jan., 1908, vol. i, No. 1, p. 61) have investigated how and to what extent fixed oils when ingested influence gastric secretion. Olive oil and cottonseed oil when given with a test breakfast decrease gastric acidity at the end of an hour and retard the evacuation of the stomach. Oil given either before or after a meal delays the height of digestion. If the oil precedes the meal the beginning and height of the secretion of hydrochloric acid are delayed. Oil given after the meal does not influence the secretion. The action of the oil is temporary and it has no effect on subsequent meals. The oil lessens gastric secretion both by peripheral and central inhibition and by mechanical action. The mechanical effect is due to its covering over the food and the gastric mucosa and thus lessening the stimulating action of the food on the gastric mucosa. Theoretically, if used therapeutically oil should precede the meal in hyperchlorhydria and follow the meal in hypochlorhydria and not be given at all when there is stasis or slow evacuation of the stomach. In practice it should be borne in mind that hyperchlorhydria and hypochlorhydria are but parts of the symptom-complex of gastric disease, and in the treatment of gastric conditions other facts than these two symptoms have to be considered.

ACUTE GASTRIC DILATATION.—Braun and Seidel (*Mitth. d. Grenz. d. Med. u. Chir.*, 1908, xvii, p. 37) have made an anatomical, experimental, and clinical investigation as to the causation of acute dilatation of the stomach. They reject the view held by Albrecht and others that acute dilatation results from occlusion of the duodenum through traction on the root of the mesentery by the empty intestines sinking into the pelvis. The idea is held that acute gastric dilatation is the result of acute gastric motor insufficiency. Acute motor insufficiency is rarely due to mechanical causes, but usually results from functional disturbances, such as alteration of gastric innervation (central, peripheral, and reflex) or to injuries to the gastric musculature. Acute motor insufficiency may also result from the accumulation of ingested materials, decomposition processes, or abnormally increased secretion. In cases of chronic dilatation mechanical factors may cause the condition to become acute. In common with Thoma (*Deutsch. med. Woch.*, 1908, No. 12, p. 501) the writers consider the acute dilatation to be primary and the arteriomesenteric occlusion found at autopsy a secondary condition. Borchardt (*Berl. klin. Woch.*, xlv, No. 35, p. 1593) advises early systematic lavage as the most important point in the treatment of acute gastric dilatation.

RELATION OF NEPHRITIS TO GASTRIC SECRETION.—The influence of nephritis on gastric secretion has been investigated by Wolff and Mortinelli (*Arch. f. exper. Path. u. Pharm.*, 1908, lviii, p. 450). From clinical observations they conclude that an excessive ingestion of sodium chloride in cases of nephritis may produce gastric hyperchlorhydria, although the same quantity of sodium chloride would have little influence on gastric secretion in health. They confirm the observations of Biernacki and others that hyperchlorhydria frequently exists in cases of nephritis, especially of the interstitial type, in which chlorine retention is most marked.

Diseases of the Liver, Pancreas, and Gall-Bladder

THE ETIOLOGY OF GALL-STONES.—The relation of infectious diseases and bacteria to the genesis of gall-stones has been the subject of much investigation. Naunyn (cited in *Jour. Amer. Med. Assoc.*, 1908, Ed.) believed that gall-stones form chiefly on account of local disturbance in the gall-bladder, and do not develop as a

result of changes in the composition of the bile secreted by the liver. He attributed an important etiological rule to local inflammatory processes (desquamative cholangitis). Gilbert (*ibid.*) found living bacteria in recent and dead bacteria in old gall-stones. Bacmeister has found sterile gall-stones that appear to be recently formed, and also has shown that bacteria can enter stones that have been previously sterilized.

Kramer (*Jour. Exp. Med.*, 1907, p. 314) was able to produce ordinary gall-stones by inoculating bile with colon and typhoid bacilli.

In acute infectious diseases, especially pneumonia and typhoid fever, Baldwin (*Jour. Biol. Chem.*, 1908, iv, p. 213) has found that there is frequently more or less involvement of the gall-bladder; and that the bile often contains an excessive number of desquamated epithelial cells, an increased quantity of cholesterin, and is often acid in reaction. There was also a deposit of cholesterin in the cells still attached to the gall-bladder. These conditions of the biliary tract certainly predispose to the formation of gall-stones.

Bacmeister (*Münch. med. Wochen.*, 1908, No. 5, 6, and 7) has studied the manner in which bacteria lead to the formation of gall-stones. He found that if sterile or infected bile stands for a long time droplets of myelin appear, increase in size, and finally crystals of cholesterin separate from the larger masses. This formation seems to take place more rapidly in bile-containing epithelial cells. Gall-stones consist of cholesterin, bile pigments, and lime salts. The cholesterin is derived from the bile where it normally occurs in solution and seems to be precipitated by chemical changes taking place in the bile. The lime salts seem to be supplied by the secreting cells of the gall-bladder, and an excessive quantity is formed when there is an inflammatory condition of the gall-bladder. Exner and Heyrovsky (*Wien. klin. Wochen.*, 1907, No. 7, p. 213) hold that the cholesterin is held in solution by the bile salts. Micro-organisms, especially the typhoid, colon, and proteus bacilli, break up the bile salts and as a result the cholesterin is precipitated and leads to the formation of gall-stones.

ACUTE CATARRHAL JAUNDICE.—Acute catarrhal jaundice is a non-fatal affection and Eppinger's (*Wien. klin. Wochen.*, 1908, No. xxi, 480) autopsy findings in an uncomplicated case are very

interesting. A girl aged 19 years and giving the usual history of jaundice following an acute gastro-enteritis from indiscretion in diet was examined clinically on the eighth day of a typical attack of acute catarrhal jaundice. On the following day she was killed by falling from a third story window and an autopsy was performed. The gall-tracts were distended and the bile could not be forced into the duodenum by pressure on the gall-bladder. The microscopical examination of the part of the common duct within the wall of the intestine showed that the occlusion was due to hyperplasia of the lymphatic tissue in the mucosa of the duct. Eppinger compares this arrangement of the lymphatic tissue to that seen in the tonsil. The swelling and occlusion of the duct by the lymphatic tissue is protective in so far as it prevents infections from the intestines from travelling upward through the gall-tracts. Virchow and Osler in previous cases have found that an inflammatory process had travelled from the duodenum into the ducts of the liver with the formation of a mucous plug and resulting in obstruction to the ampulla of Vater.

ACUTE YELLOW ATROPHY OF THE LIVER.—Several reports of cases of acute yellow atrophy of the liver of some interest have appeared during the past year. One of the cases reported by Tileston (*Boston Med. and Surg. Jour.*, 1908, clviii, No. 510) occurred in a boy who was suffering from a double panophthalmitis resulting from injury. Daily inunctions of mercury were given for antiphlogistic purposes, although there was no syphilitic history. After nearly two months of mercurial treatment the boy developed acute yellow atrophy of the liver and there is a probability that the prolonged use of the mercury was an etiological factor. Tileston attributed the ascites present in his second case to changes in the hepatic circulation. The interesting point in Reichmann's (*Munch. med. Wochens.*, 1908, No. 18) case was the finding of a Gram-negative non-pathogenic micro-organism in the circulating blood. The author does not believe that the micro-organism was the cause of the affection. The patient also suffered from an interstitial keratitis. One of the four cases reported by White (*Boston Med. and Surg. Jour.*, clviii, No. 510) was in the second stage of syphilis. The blood examination in his case showed leucocytosis with an increase in the red cells (5,120,000 to 6,720,000), and a decrease in hæmoglobin from 80 to 60 per cent.

Diseases of the Kidneys

THE ETIOLOGY OF CHRONIC NEPHRITIS.—EMERSON (*Arch. of Int. Med.*, June, 1908) calls attention to the gradual increase in death-rate from renal disease. The increase seems to be real and apparently is not due to more accurate methods of diagnosis. Experimental investigations show that nephritis, or experimental lesions very similar to those seen in the human body as the result of the disease, can be produced by the action of toxins; mineral, vegetable, bacterial, and cellular. In chronic nephritis it seems that other etiological factors play a part, especially circulatory disturbance, such as the effects from too little arterial and too much venous blood.

Emerson attempted to produce circulatory disturbance in the kidneys of animals by the intermittent inhalation of alcohol over a period of six months or longer. The effect on the kidney was some degeneration of the tubules and the formation of areas of young connective tissue. Emerson's investigations bring out the importance of vascular disturbances in the etiology of chronic nephritis.

CHEMICAL CORRELATION AS APPLIED TO THE PATHOLOGY OF THE KIDNEY.—A study of the relation which vascular hypertension, heart hypertrophy, uræmia, and œdema bear to the renal lesion itself, is of great clinical interest. Pearce (*Proc. Phila. Path. Soc.*, Oct., 1908) first investigated the effect of products retained in or arising within the organism during nephritis and the correlation of disease of the kidney with the internal secretions of the adrenals and other organs. This necessitates a consideration of the old theory of the internal secretion of the kidney in the light of the recent knowledge of the action of chemical controls.

The clinical observations on the effect of nephrectomy and ligation of the ureter in man are merely suggestive of an internal secretion of the kidney. In many cases of ureter obstruction no marked uræmic symptoms are seen, and death does not usually occur within the first two weeks after obstruction of the ureter. After nephrectomy, uræmic symptoms usually occur and death follows within four to six days.

Experimental nephrectomy and ureteral ligation in animals is of little aid in the study of problems pertaining to the kidneys,

because it is practically impossible to recognize uræmic symptoms in animals. Meyers (cited by Pearce) considers Cheyne-Stokes respiration to be the best indication of uræmia in animals. The therapeutic use of kidney extracts in cases of nephritis has been practically abandoned. Cornot and Lebreve (*Arch. de Med. Exper., d'Anat. et l'Anat.*, 1907, No. xix, p. 388) claim that the kidney extracts from animals after unilateral nephrectomy stimulate the regeneration of new kidney substance.

Metabolism studies in chronic nephritis in man have shown that uræmia may occur without nitrogen retention and nitrogen retention may be present without uræmia; but in uræmia there is usually more or less nitrogen retention, and uræmia without nitrogen retention is more apt to occur with a subsiding œdema and as a resulting return of extracts from the tissues into the circulation and thence in contact with the nervous system.

Metabolism studies in animals show that the removal of a large portion of the kidney substance interferes with the functions of the digestive tract and thus leads to disturbance of nutrition. An attempt was made by Pearce to determine if the digestive disturbance observed in nephritis could be explained by the lack of a chemical control from a possible internal secretion of the kidney. A chemical control could not be demonstrated. The inanition and gastro-intestinal disturbances do not seem to be due to impaired absorption or undue elimination of protein substances. The elimination of toxic substances by way of the digestive tract may interfere with the digestive processes.

The influence of the kidney on the circulatory system was investigated and experimental studies of the effect of kidney extracts on blood-pressure were performed. It was found that injections of kidney substance into the circulation of a rabbit produced some rise of blood-pressure, but the injection of almost any substance in 1 to 3 c.c. doses causes a transient rise of blood-pressure in rabbits. The only depressor effect observed from kidney extract seemed to be due to the solids of the urine. The idea that the kidney extract contained a blood-pressure-raising substance could not be confirmed.

The effect on the heart and blood-pressure of extirpation of large portions of the kidney has been investigated. Parsalie and

Heineke (*Verhand. d. Deutsch. Path. Gesellsch.*, vol. ix, p. 97) report that in about 25 per cent. of the animals that survive the removal of two-thirds to three-fourths of the kidney a permanent rise of blood-pressure associated with cardiac hypertrophy results. In such animals there remains a tendency to arterial spasm and further rise of blood-pressure in response to slight vascular stimulation. This is an important evidence of chemical correlation of the renal and cardiovascular systems.

Potassium chromate produces in dogs a form of experimental nephritis with parenchymatous changes. Uranium nitrate seems to affect both the tubules and the vascular structures. When injected into healthy dogs the serum from cases of chromate nephritis caused a slight rise in blood-pressure, but the serum of cases of uranium nephritis caused a distinct fall in blood-pressure. When injected into normal rabbits both uranium and chromium nephritic sera caused a continuous definite rise in blood-pressure. Therefore experimental disturbances of kidney functions in some way affect blood-pressure.

Vaquez and others claim that hyperplasia of the adrenal is commonly associated with the contracted kidney and arteriosclerosis. Pearce (*Jour. Exp. Med.*, 1908, No. 5) studied the anatomical changes in the adrenals from the autopsy material of the Bender Laboratory. The conclusion was reached that hyperplasia of the adrenals is relatively frequent in the third, but reaches its maximum in the fourth, decade of life in association with chronic arterial diseases. It is almost a constant lesion in arteriosclerosis associated with chronic interstitial nephritis and left ventricular hypertrophy, but is almost of equal frequency in arteriosclerosis and chronic parenchymatous nephritis. The hyperplasia of the adrenals may be seen in arteriosclerosis without chronic nephritis and in chronic nephritis without arteriosclerosis. The view is reached that hyperplasia of the adrenals, chronic arteriosclerosis, and chronic renal diseases are frequently associated and may result from the same common cause.

The presence of adrenalin or adrenal-like substances in the serum of nephritics has been investigated by taking advantage of the fact that adrenalin in a dilution of one part to one million parts of physiologic salt solution causes dilatation of the pupil of

an enucleated frog's eye. Schur and Weisel (*Wien. klin. Woch.*, vol. xx, p. 699) report that the serum of patients with chronic nephritis in a dilution of 1 to 20 gave a positive adrenal reaction. A positive reaction was not obtained with serum from normal persons. Schlager (cited by Pearce) was not able to confirm their observations, but usually found the reaction less in contracted kidneys than in controls.

Pearce recalls the observation of Lindemann that the serum of an animal suffering from chromate nephritis causes lesion of the kidneys when injected into a normal animal. Pearce and Sawyer (*Jour. of Med. Research*, 1908) confirmed the nephrotoxic action of the serum of animals with nephritis. When dogs were used in the experiments, the serum was nephrotoxic, but with rabbits the results were negative.

Recent studies in cedema show that uranium nephritis in rabbits is accompanied by cedema. In chromium nephritis cedema does not occur. Now if the serum of animals with uranium nephritis is introduced into an animal with chronic nephritis a well-marked cedema develops. From other experiments it seems that the cedema at least in part is due to toxic substances accumulating in the blood and exciting an injurious action on the endothelium of the capillaries.

The Effects of Exposure to Intense Heat

A disorder due to exposure to intense heat and characterized clinically chiefly by violent muscular spasms and excessive irritability of the muscles with conspicuous fibrillary contractions has recently been described by Edsall (*Jour. Amer. Med. Assoc.*, Dec. 5, 1908, p. 1969). The painful spasms affect principally the muscles of the calves of the legs and the abdomen. Since his first cases were observed in 1904, a number of additional cases have been seen. A number of other clinicians state that they have observed the condition in persons exposed to extreme heat. In two cases in which the metabolism was studied interesting changes were observed.

Compressed-air Illness

An important report on the prevention of compressed-air illness has been made to the British Admiralty by Boycott, Damant, and Haldane (*Quarterly Jour.*, London, April, 1908). Compressed-air

illness results from the taking up by the body fluids of large quantities of nitrogen while under pressure and the sudden liberation of the gas when the pressure is removed with the resulting formation of bubbles of nitrogen. Fatty tissues have been found to absorb six times more nitrogen than the blood. The rate of saturation of the body is more rapid at first, i.e., when the pressure is low, and decreases as the point of saturation is reached. The method of quick safe decompression depends on this fact. The nitrogen pressure in the tissues should never be more than twice the air pressure, but this permissible difference in pressure should be taken advantage of in decompression. Uniform slow decompression is not advised. If symptoms appear during decompression prompt recompression should be undertaken in order to compress the small bubbles of nitrogen at once; but it has been found that the bubbles of nitrogen undergo reabsorption with difficulty.

Diseases of the Blood

Robertson, Illman, and Duncan (*Jour. Amer. Med. Assoc.*, May 16, 1908), have studied the coagulation of the blood with special reference to the therapeutic efficacy of alleged coagulants. They conclude that:

1. During the febrile stage of the infectious diseases coagulation is noticeably retarded.
2. The clinical employment of the calcium salts has no direct or invariable effect on the coagulation time of the blood, either in large doses one hour after its administration or in small or large doses at any subsequent period, even extending over two or more weeks.
3. In our hands the calcium content of the blood, as determined in terms of ammonium oxalate, proved unreliable.
4. We were unable to show definite relationship between leucocytosis and coagulation time.
5. Nucleic acid uniformly failed to produce an increase in the number of leucocytes and also failed to hasten coagulation. (Nucleic acid after the formula of Vaughn and McClintock was employed in one-dram doses hypodermically.)
6. We have shown conclusively the relation of the coagulation time to hemorrhage.

7. Though not as striking as some of our other results, we have been able to show that citric acid prolongs the coagulation time; and it seemed, even when the difference in time before and after its use was not a very material one, that the viscosity of the blood was lessened.

Richer (*Berlin klin. Wochen.*, Oct. 12, 1908) reporting from Kraus's clinic in Berlin reviews a new method of treating pernicious anæmia, which is based on the assumption that the body cholesterin anchors or binds a hæmolysin of complex constitution which is found normally in the blood. If cholesterin be not present in adequate amounts, more or less of this hæmolysin remains unanchored and free to do its destructive work upon the erythrocytes. This assumption is based upon laboratory experiments which have demonstrated the presence of the hæmolysin and upon the fact that solutions of cholesterin fix the hæmolysin *in vitro*. He administers daily about 100 Gm. of a 3 per cent. solution of cholesterin in olive oil, flavored with a little peppermint. He cites four cases, in three of which this treatment had a salutary effect which lasted for a while at least; in the fourth no apparent benefit was noted from the use of cholesterin, but arsenic in this case gave good results. In the first case the erythrocytes in the course of a week's treatment rose from 750,000 to 1,750,000 and the hæmoglobin rose from 18 to 30 per cent. This improvement lasted for some months, when the anæmia returned with a fatal issue. In the second case the red cells increased from 1,000,000 to 2,300,000, while the hæmoglobin went up from 20 to 40 per cent. The third case showed a rise in the erythrocytes from 3,000,000 to normal and in the hæmoglobin a rise from 30 to 40 per cent.

Cancer

An excellent review of the results of modern cancer research appeared last year in the *INTERNATIONAL CLINICS*, vol. iii, series 17. The year 1908 has been quite prolific of facts gleaned regarding cancer; but few of these have any clinical value and none are capable of practical application. Due respect has been paid, of course, to the etiology, and this year, like so many of its predecessors, has brought forth its share of new, not to say unique, theories. But the most important observations have been those concerning

cell growth and the constitutional factors, inherent or acquired, by which it is modified.

In discussing heredity in cancer, Bashford (*Lancet*, London, Nov. 21, 1908) refers to reports sent in to the Imperial Cancer Research Fund during 1906 and 1907. These reports covered 2,932 cases of malignant new growths. He concludes that "with nothing but negative evidence of the part played by inherited constitutional conditions before us and with positive evidence of the important part acquired constitutional conditions can play in furthering the growth and perhaps the development of cancer we shall more profitably spend our time if we seek frankly to ascertain how they are acquired, than if we continue to preach the doctrine that they are inherited and that it is hopeless to contend against them."

On the other hand Tyzzer (*Proc. Amer. Assoc. for Cancer Research*, April 15, 1908) reports experimental evidence in favor of inheritance of susceptibility to cancer in mice. He obtained hybrids by mating Japanese females with common males. The offspring resembled the common mice. He then inoculated an adenocarcinoma which had occurred spontaneously in a Japanese mouse into ten Japanese mice, ten hybrids, and ten common mice. The transplants grew slowly, as usual, in all of the Japanese mice; they grew much more rapidly in all of the hybrids; and did not grow at all in the common mice.

We must not lose sight of the fact that Bashford's statements refer to constitutional factors in the individual, while Tyzzer's experiments deal with racial factors which have been known to exist for some time. However, it is interesting to find that these racial factors can be inherited by hybrids.

In regard to the endemic occurrence of cancer Pynes (*Jour. Amer. Med. Assoc.*, March 21, 1908) writes of an endemic at Fishersville, Va., and summarizes his article as follows: "There has been an endemic of cancer in Fishersville and vicinity for a number of years. At one time there was a high mortality from cancer among those who lived in the community, by no means confined to families, succeeded by a period in which there was comparative immunity to the disease. This period is followed by a decade in which there is a recurrence of the disease, causing a

higher mortality in my own practice than that of any other disease." He believes cancer is due to an infectious organism.

The endemic occurrence of cancer among the mice of a certain breeding establishment in Massachusetts is pointed out by Gaylord (*Proc. Amer. Assoc. for Cancer Research*, Nov. 15, 1907; and April 15, 1908). Here, during a period of two years 99 tumors developed among approximately 9200 mice. During the past year this breeder began raising white rats at Gaylord's suggestion, and among 1000 rats four spontaneous tumors appeared. In contradistinction to this he cites the experience of a breeder in Washington with whom he has had dealings for the past three years. During this time not one tumor appeared among the stock of this establishment, although it produces 2500 white mice annually and about as many white rats.

Bashford, basing his conclusions on the observation of several thousand animals, estimates the incidence of cancer in mice as 1 in 3500. The occurrence of cancer in the Massachusetts establishment is more than 1 in 100, at least 35 times more frequent than the average according to Bashford.

Gaylord (*ibid.*, Nov. 27, 1908) reported further on the endemic occurrence of cancer among trout in a certain tank of a fish hatchery. The disease did not occur in other tanks although they were supplied with the same water and in some cases were inhabited by the same species of trout. New trout, but not other species, when introduced into this particular tank acquired the disease.

Seeming to favor the parasitic origin of cancer, as Moore and Walker have claimed, are some experiments which Gaylord (*ibid.*, April 15, 1908) carried out on the resistance of mouse tumor-tissue to freezing with liquid air at a temperature of -195° C. for periods of 40 and 80 minutes. He found that this procedure in either case did not prevent the development of tumors when the material was afterward inoculated into mice, but the vitality of the tumor was greatly lessened as shown by the markedly decreased number of successful inoculations, the later appearance of the growths, and their tendency to retrograde. As controls to these experiments he froze embryonic tissue and trypanosomes under like conditions and found that both were rendered inert. Gaylord does not agree with Moore and Walker that these experiments demon-

strate the presence of a virus, although he believes in the existence of such a virus. To his view they show the great resisting power of cancer cells.

Leo Loeb (*Jour. Amer. Med. Assoc.*, June 6, 1908) has carried out a most interesting series of experiments in which he has succeeded in producing deciduomata at will, and from which have been gleaned a number of facts that throw new and important light on the problem of tumor formation. He finds that by making incisions through the wall of the uterus of a guinea-pig at a time which holds a definite relationship to the period of "heat" or "rut," deciduomata are produced. These originate through a proliferation of the interglandular connective tissue of the mucosa by mitotic division. As a rule, they become entirely necrotic fifteen days after the operation, and gradually shrink. The co-existence of pregnancy does not prevent this necrosis. There exists a definite time curve which indicates the chances for the development of deciduomata, and the optimum of this curve is from four to nine days after the period of "heat."

All of the facts adduced show that a certain substance secreted by the ovaries is responsible for the new formations, and that very probably the corpora lutea are the part of the ovary which secretes this substance. The necrosis and disappearance of these growths take place independently of conditions of nutrition, as determined through their blood-supply; and the time of this necrosis must be compared with the time of disappearance of the corpus luteum after the causative factors leading to its development have ceased to exist. It is shown that certain substances prepare the uterine connective-tissue cells to proliferate and form decidua, and it seems evident that these substances which prepared the cells for proliferation are necessary for their life. Loeb designates these formations as "transitory tumors" and says: "If the substance were secreted by the ovaries continuously, instead of intermittently, the tumors would lose their transitory character and would become permanent new growths." He continues: "We know that the origin of the deciduomata depends upon two sets of conditions: (a) that a predisposing chemical substance be produced by a certain organ; and (b) that, such a substance having been produced, indifferent stimuli, for instance, traumatisms, are sufficient to produce the

tumors." He claims that a "preparing" substance cannot explain the growth of a tumor which can be transplanted into many other individuals who are not likely to possess such a "growth" substance, but that it can only account for the development of a "transitory tumor," or, at best, a tumor that grows indefinitely in the same individual in which it originated. At present, he says, "we must assume that transplantable tumors carry with them in the tumor cells or in their direct neighborhood the stimulus which enables them to proliferate in a new host."

Beebe and Crile (Reports of the Cancer Laboratory of the N. Y. State Board of Health, 1905 and 1906) working with a lymphosarcoma of dogs were able to demonstrate the presence of both natural immunity and acquired immunity. A series of ten dogs with actively growing lymphosarcomata were transfused with the whole blood of dogs which had either shown a natural immunity to transplantation or had spontaneously recovered from a tumor. Eight of the dogs after transfusion showed a complete retrogression and disappearance of the tumor and thereafter failed to develop tumors on repeated inoculation. The relative immunizing power of the blood of naturally immune dogs and of that from dogs spontaneously recovered could not be accurately shown, but the impression gained was that large transfusions of blood from spontaneously recovered dogs was most effective.

Beebe (*Proc. Amer. Assoc. for Cancer Research*, April 15, 1908) proved that this active immunity conferred was dependent upon retrogression of the tumor, which was inaugurated by transfusion of immune blood, and was not due to the transfusion itself. Five dogs were inoculated with tumor and when the growth had progressed far enough to show that the animal was susceptible, it was removed and the animal given a large transfusion of immune blood. From a week to ten days later the susceptible animals were again inoculated with tumor tissue and all gave positive results.

These facts, to sum up, would seem to indicate that: (1) certain chemical conditions, one or various, in the organism may render the inauguration of a neoplasm possible; (2) certain chemical conditions, the same as the foregoing or different, are necessary to the vitality of a tumor; (3) certain substances produced in the organism or introduced may promote the vitality and accelerate

the growth of a tumor, and the converse of this is true, that certain substances produced in the organism or introduced may decrease the vitality and inhibit or even suppress the growth of a tumor and cause it to retrograde. These we believe to be among the most important, if not the most important, facts brought out by cancer research and very possibly, or even probably, investigation along these lines will lead to a cure for cancer and perhaps discover the cause.

Ewing and Beebe (*Arch. of Int. Med.*, Chicago, Feb., 1908) studied the nature of the infectious lymphosarcomata of dogs, especially with the idea of determining whether or not this disease might be a form of canine syphilis. Their studies, taking into consideration the histology of the primary growths, the nature of the visceral metastases, and the loss of infectivity of the filtrate through paper, all led to the conclusion that these tumors were true malignant neoplasms and that they were not due to infection by spirochæte or other micro-organisms. They were able to confirm their previous findings as to the fate of transplanted pieces. The cells of these pieces grew and gave rise to the new tumor, which in no way derived its origin from the cells of the host.

The results of the investigations of Loeb, Hunter, and Laws (*Proc. Amer. Assoc. for Cancer Research*, April 15, 1908) as to the mode of origin of these lymphosarcomata following transplantation were in accord with Beebe and Ewing's findings. According to them the peripheral cells of the transplanted pieces remain alive and propagate soon after inoculation and thus produce the new tumor. At no stage could the cells of the host be observed to participate in the formation of the new growth.

Handley's (Editorial, *Jour. Amer. Med. Assoc.*, Dec. 19, 1908; "Cancer of Breast and its Operative Treatment," 1906) studies of metastasis in cancer of the breast show that dissemination of the disease takes place nearly always through the vast mesh-work of lymphatics that lies just above the deep fascia. This mesh-work extends over the whole body and sends branches outward to the skin and inward to the deeper tissues and viscera. It is seldom, in his opinion, that the disease is spread through blood embolism.

In a paper on secondary cancers of the skin, Daus (*Virchow's*

Archiv, Berlin, cxc, No. 2) reports 38 cases from the literature in which primary internal cancer was followed by skin metastases. He refers to a case of primary carcinoma of the stomach in which 280 small hard subcutaneous tumors were distributed over the trunk and thighs.

Dudley (*Jour. Amer. Med. Assoc.*, May 23, 1908) concludes from a study of the prevalence of cancer in the Philippine Islands that the disease is not only not confined to temperate climates but that it exists in the Philippines to a greater extent than in the United States.

Beebe (*Boston Med. and Surg. Jour.*, Dec. 26, 1908) has carried out investigations on the inorganic constituents, proteids, toxins, hæmolytic substances, and enzymes of tumors. He has found that actively growing tumors contain much larger amounts of potassium and sodium and much smaller amounts of calcium than are contained in old necrotic tumors. The distribution of iron and phosphorus is not different from that in normal tissues. He found larger amounts of nucleoproteid, more albumin, much more coagulable nitrogen, and less globulin in tumors than in normal tissues. Primary epithelial growths were found to contain no nucleohistone, while the secondary growths in the lymph-nodes invariably yielded this substance and in this respect at least metastases differ from primary growths. Extractions of tumor tissue, and especially those of necrotic tumors, are much more toxic than extractions of normal tissues. His investigations of hæmolytic substances show that extractions of normal organs which contain blood are distinctly hæmolytic, while extractions of blood-free organs are but slightly so. However, the hæmolytic action of the latter may be activated by the addition of a small amount of hæmolyzed red blood-cells. Extractions obtained from rapidly growing tumors are more hæmolytic than those from normal organs, but extractions from necrotic tumors and organs are a hundredfold more hæmolytic. Beebe has obtained evidence that these hæmolytic substances in tumor tissues are a factor in the cause of anæmia and cachexia. Tumors are found to be rich in enzymes, but no specific enzyme is demonstrable.

The discovery of hæmolytic substances in the serum of cancer patients promised to be of value in diagnosis of the disease.

Kelling (*Archiv f. klin. Chir.*, Berlin, vol. lxxxv, No. 1) has studied the subject for over three years and has used both the precipitin test and the hæmolytic test in diagnosing cancer. He states that he has by this means succeeded in determining the presence of this disease when conclusive signs of it were absent.

Weil (*Proc. Amer. Assoc. for Cancer Research*, Nov. 15, 1907), in this country, has made rather extensive studies of the hæmolytic reaction.

Crile (*Jour. Amer. Med. Assoc.*, Dec. 12, 1908) believes that this test offers additional evidence which may be used in the diagnosis of cancer or tuberculosis, but this evidence is not as yet specific.

Our present knowledge of hæmolysis in cases of cancer, tuberculosis, and other diseases is in such a state to-day that we can hardly rely upon this test as a means of diagnosis. Numerous and well supported objections have been raised as to its specificity and its accuracy. Clowes (*Proc. Amer. Assoc. for Cancer Research*, Nov. 27, 1908) thinks the reaction is of little or no value because we have no standard of measuring the degree of hæmolytic activity. It seems to us that Clowes's objections might be overcome and that a standard measurement of hæmolytic activity might be readily established. But the chief objections to the test to our mind seem to be the numerous and very variable factors which enter into the reaction. The hæmolytic activity of normal sera is known to vary. The resistance of normal corpuscles to the hæmolytic action of sera is known to vary. Weil has shown that in some cases of malignant new growths no hæmolytic action on the part of their sera is demonstrable. The whole question to our mind seems to be in an unsettled state and we must await future developments before we can place a definite value upon this test as a means of diagnosis.

SURGERY

BY JOSEPH C. BLOODGOOD, M.D.

Correlation of Sciences

THE recent meeting in Baltimore of the American Association for the Advancement of Sciences illustrates the very important relation between the science and practice of medicine and other sciences. This is especially true of anatomy, physiology, chemistry, and biology. The practical value of bringing the general practitioner in closer relation with scientific men has been dwelt upon recently in an address by Dr. Welch of Baltimore. In a paper of this kind, on the progress of surgery, there is little space to go into the details of this question, but at the present time progress in surgery depends more upon investigations in the laboratory, with and without animal experimentation, than upon clinical observation.

An experimental laboratory study demonstrating that the cause of death in pancreatitis is due to the toxic effects of trypsin became immediately available to practical surgery. In acute pancreatitis the abdomen is filled with a blood-stained fluid containing this toxic substance. For this reason immediate laparotomy with the removal of the fluid and drainage to the inflamed pancreas to prevent further leakage is indicated, and now further clinical experience confirms the experimental work. Previous to this surgeons held different opinions as to the value of immediate operation in acute hemorrhagic pancreatitis.

It is important to stimulate among the practical workers in medicine a greater desire to keep themselves more familiar with the scientific work going on in this country and abroad. Teachers in the third and fourth years in the medical schools should, in their instruction, dwell more upon the anatomical, physiological, and chemical aspects of disease. Men who contribute to the literature of surgery should, in their investigations, look into these more scientific aspects of their question and emphasize them in their contributions.

There is not space here to develop this thought further; but there is a growing need to lay special stress upon the fact, now definitely established, that scientific medicine is practical medicine. Other things equal, the better a physician is trained in the sciences correlated to medicine the better he will be able to practice it successfully.

THE RELATION OF PSYCHOLOGY TO SURGERY.—In the last two years the medical aspects of the so-called simpler mental diseases have received more attention, perhaps, than all the other departments of medicine; and this has stimulated surgeons to examine more critically into the mental symptoms of definite surgical lesions. A glance at the Index of the *Journal of the American Medical Association* for vols. I and LI of this year will illustrate the greater number of references under the headings "Psychology" and "Psychosis," than under "Anatomy," "Physiology," or "Chemistry." At the meeting of the Washington State Medical Society in Walla Walla during September of this year I felt that this subject was of sufficient importance to present it in one of my addresses.

It will be valuable for all of us to extend our reading among books devoted to pure psychology. Among others I have found much help in the writings of William James.

In surgery the investigation of the mental aspects has a very practical bearing. I am of the opinion that the good results of operative intervention have already influenced the public, and that the elements of fear and anxiety when facing an operation are distinctly less. It is very difficult to estimate how much this alone has reduced the mortality of operations.

We should endeavor to present to patients the necessary operation in such a way that the elements of fear and anxiety are reduced to a minimum. This attitude of the surgeon, his assistants, and every one connected with the surgical clinic should be intelligently maintained. There should be careful supervision of the method by which patients are received in the hospital, and this supervision should be continuous until the patients leave the hospital. The chief object of this supervision should be to add to the usual careful surgical treatment the newer and more definite measures designed to relieve the patients of the elements of fear and anxiety.

It would be out of place in this brief review to go into the details of these measures, but I feel convinced that surgeons as well as physicians must give more attention to the psychological side of surgical diseases and to the measures now recognized as important for their relief.

In discussing this question with Dr. Meltzer of New York, he agreed with me that the profession must be careful not to overdo this subject in the direction of publicity. At least, at the present time, from the standpoint of the patient, ignorance is bliss, and it is folly to be wise. The suggestion treatment gives better results when the patient is ignorant of the method.

RELATION OF ANATOMY TO SURGERY.—Taking the Index of the *Journal of the American Medical Association* as a guide to the comparative interest that different subjects command, we would conclude that in the last few years anatomy has excited the least interest in the profession as a whole. However, during a period of less than ten years the members of the profession who have been devoting themselves to anatomy have made more progress than ever before in the history of this country, and the scientific anatomist to-day in the United States ranks with the best in the world. I have gone over the *American Journal of Anatomy* since its first publication in 1901; and the *Anatomical Record*, which first appeared in 1907. The contributions in both of these journals are of the most scientific order and deal chiefly with the development of anatomical research along new lines. In only a few of the contributions has this research reached a point in which it can be considered of practical value. But I am confident that in a very few years the study of anatomy along these new lines will revolutionize the instruction in anatomy in medical schools and simplify many of the very complex questions. There is yet no very good medium of communication between the pure anatomist and the general practitioner. I am of the opinion that there is room for a greater number of younger physicians and surgeons to devote attention to what may be looked upon as the medical and surgical aspects of anatomy. With the aid of a pure anatomist such investigations undoubtedly will develop results of practical value.

Some years ago G. G. Davis of Philadelphia (*University of Penna. Med. Bull.*, January, 1903) discussed just this standpoint,

in an article entitled "The Value of a Knowledge of Anatomy from a Practical Standpoint."

The interest awakened in the relation between the tonsil and polyarthritis has stimulated both anatomical and physiologic investigations. Barnes (*Boston Med. and Surg. Journal*, September 24, 1908) gives a very good description of the anatomy in its practical relation to tonsillectomy. Barth (*Deutsche Med. Wochenschr.*, vol. xxxiii, No. 49, December 5, 1908) on the other hand, from his anatomical and physiologic investigation of the tonsils, concludes that the systematic tonsillectomy for hypertrophy is not indicated. Hypertrophy testifies to excessive function, and the tonsils may serve a useful purpose as aids in eliminating toxic substances and bacteria circulating in the body fluid. He is of the opinion that in some cases of tonsillitis the infection reaches the tonsil from within, and not, as usually supposed, from without.

These two contributions of Barnes and Barth illustrate the point that I am anxious to make clear as to the correlation of the sciences to practical medicine.

From clinical investigation we have come to the conclusion that the tonsils are a portal of entrance for infection which may lead to acute, chronic, or progressive polyarthritis. The natural inference is tonsillectomy. The older method removed but the upper portion. To perform tonsillectomy more radically the practical surgeon whose duties compelled him to perform this operation found that there was needed further anatomical research upon which to base a simple and complete tonsillectomy. The reference which I gave to Barnes is only one of a number.

Barth, however, attempts from a physiological study to find out whether the clinical conclusion which seemed logical is really correct. Is it best for the individual to have enlarged tonsils removed? Barth concludes as I have stated.

This is an important question to decide. The anatomical problem is apparently settled. We have good methods based upon anatomical studies which will allow us to remove the tonsil completely without any danger. Now we must settle the question as to the indication for tonsillectomy. In view of Barth's work and some experience of my own, I venture at this time to raise the question as to the propriety of wholesale tonsillectomy and opera-

tions upon nasal hypertrophy and small polypoid growths. I should like to see a large group of cases studied critically and further investigations along the lines mentioned in Barth's communication.

RELATION OF PHYSIOLOGY TO SURGERY.—The Index to the literature portrays a greater interest in physiological questions, and a healthy, growing interest. In surgery the two questions chiefly discussed are shock and blood-pressure. The relation of physiology to surgery is perhaps best illustrated in surgery of the chest and in the physiological investigations as to the question of positive and negative pressure. Since I first introduced the subject in this journal in 1905 the literature has become voluminous, and the question still absorbs the interest of a small group of investigators here and abroad, but the point that I wish to emphasize is that progress in surgery of the chest depends upon physiological investigation, and that most of the work must be done upon animals before it is justifiable to make the attempt upon the human being.

Liebermeister (*Deutsche Med. Wochenschr.*, vol. xxxiv, No. 39, September 24, 1908) contributes to the physiology of the respiratory organs, especially to the relation between stenosis and emphysema, with the definite conclusion that stenosis should be relieved early, because after a certain length of time the emphysema remains permanent. We have here, therefore, an indication for prompt relief of respiratory obstruction which, of itself, does not demand immediate treatment to save life. We can use this as an argument in favor of the operative treatment of larger goitres.

William P. McAdory (*Alabama Medical Jour.*, May, 1908) writes on the importance of the study of physiology by the general practitioner. G. W. Spencer (*Lancet Clinic*, Cincinnati, June 13, 1908) gives his views as to when physiology should be taught at college.

SHOCK.—The most interesting contribution for the year on this subject is by Meltzer of the Rockefeller Institute (*Archives of Internal Medicine*, July, 1908, vol. i, 571). He does not wholly agree with Crile. Seelig and Lyon of St. Louis (*Jour. of Amer. Med. Ass.*, Jan. 2, 1909, vol. lii, p. 45) give a brief summary of the more important literature and their experiments on the condition of the peripheral blood-vessels in shock, with the conclusion also against the view of Crile, that in shock there is vasomotor exhaustion.

The results of the investigation on the subject of shock during the last two years and my own clinical experience has not led me to change the views expressed in "American Practice of Surgery" (vol. i, 1906, p. 463).

The following papers should be read. Crile and Dolley (*Jour. of Experimental Med.*, Nov., 1908, vol. x, p. 782), on the effect of complete anæmia of the central nervous system in dogs resuscitated after relative death; Guthrie and Stewart (*Jour. of Experimental Med.*, July, 1908, vol. x, p. 490), "Studies in Resuscitation: IV, the Return of Function in the Central Nervous System after Temporary Cerebral Anæmia"; and Zeller (*Deutsche. Zeitschr. f. Chir.*, 1908, vol. xcv, p. 488) on experiments with the resuscitation of animals by arterial transfusion of the heart and central nervous organ.

BLOOD-PRESSURE.—Both in laboratory work and in the clinic an apparatus for the estimation of blood-pressure is becoming almost indispensable. I have expressed the opinion before, that a blood-pressure apparatus should be carried by the physician along with his stethoscope and thermometer, and that blood-pressure records should be routine procedures before, during, and after surgical operations. I am of the opinion that as we become more expert with taking and interpreting blood-pressure we will find it of practical value. Beall and Mason (*Jour. of Amer. Med. Ass.*, April 4, 1908, vol. 1, p. 1121) have devised a very simple portable instrument for the general practitioner. Norris (*Univ. of Penna. Med. Bull.*, April, 1908, vol. xxi, p. 50) gives a very clear discussion of the present views of the pathological physiology of blood-pressure, with references to some of the best literature. Williams (*Clinical Journal*, London, Jan. 8, 1908) writes very impressively on the practical value of blood-pressure estimations.

In pleurisy with effusion and in empyema blood-pressure records and clinical observation have portrayed the danger of collapse due to a sudden lowering of the blood-pressure apparently of reflex origin. In cases of pleurisy with effusion one should avoid sudden change in position, and in operations for empyema, both acute and chronic, the surgeon should avoid if possible general anæsthesia; after resecting the ribs cocaineize the parietal pleura; after incising the pleura avoid all manipulations that will irritate the parietal

pleura. It is best simply to introduce a drainage tube, and neither irrigate nor swab. These points are emphasized by Capps and Lewis (*Amer. Jour. of Med. Sciences*, December, 1907, cxxxiv, p. 868; and *Archives of Internal Med.*, 1908, vol. ii, p. 166).

Preparation for Operation

There is yet a difference of opinion in regard to the details of the preparation for operation and anæsthesia. There can be no general rule for all cases. In some the preparation may be of the simplest and cover but a short period of time. In others the details of the preparation should be extended, both as to time and method.

In all cases the physician and surgeon should study the method of presenting to the patient the surgical intervention in such a way as to give him absolute confidence in the immediate and ultimate result. As I stated in discussing the relation of psychology to surgery, there is great room for improvement, and I am confident that the element of fear and anxiety can be largely eliminated. There is a difference of opinion as to how serious operations with a considerable element of risk should be presented to the patient. Undoubtedly, if the patients are adult men on whom a family depends for support, they should be informed to a certain extent of the element of risk. In my experience, it is much wiser to present this first to the family or friends and be governed somewhat by their opinion as to what should be told the patient. We are influenced also by the mental make-up of the patient. If the operation is inevitable, I am of the opinion that the surgeon fulfils his duty best by presenting it in the most optimistic light.

Other things being equal, the briefer the interval between the time when the operation is proposed and when it is performed the better the effect upon the patient.

In all cases my experience teaches me that the bowels should be evacuated and that food should be restricted. When the operation to be performed is not upon the abdominal cavity this preparation can be of the simplest, except in certain individuals. Patients who are very stout and whose habits are those of excess in food, alcohol, and tobacco, undoubtedly exhibit after anæsthesia and operation less discomforts, and the probability of complications

are reduced, if they are subjected to a pre-operative treatment of careful catharsis, restricted diet, and increased water.

In all abdominal cases, and especially those in which the lumen of the intestine must be opened, it is the consensus of opinion to-day that the pre-operative treatment of catharsis followed by restricted diet should begin at least forty-eight hours before the operation.

There is very little in recent literature on this subject, but I am of the opinion that there is room for an interesting and important investigation along these lines in large surgical clinics throughout the country which will allow the study of larger groups of cases. Personally I find myself each year becoming more careful in selecting certain cases for more careful and prolonged preparation, irrespective of the nature of the operation; and in abdominal cases I make an exception to the rule only when forced to do so by the acuteness of the abdominal lesion.

Undoubtedly, if one considered only the mental attitude of the patient, one would make light of the preparation and have the operation follow immediately after admission to the hospital. Important as this may be in some cases, it is not of sufficient weight to allow its employment in all. When the longer preparation is indicated, the patient's mind can be relieved, and as a rule put entirely at ease, by the proper presentation of the reasons for these preparations.

The preparation for the operation covers a very large field. Most operations to-day are simple, and the majority of patients do well. These results have a tendency to make the physician and surgeon less vigilant to select from the greater number the smaller for whom the preparation must be different and extend over a longer period of time.

It goes without saying that the indications for operation must be clear. However, in one's attitude towards the local disease which demands operative interference one must not overlook a most minute investigation into the general condition of the patient and especially of certain organs on which extra work is thrown by the anæsthesia and other new conditions which accompany the surgical intervention. Undoubtedly the risks can be at least minimized by appropriate pre-operative treatment.

We now know that in diabetic patients restriction of food before and after operation has more deleterious effects than the opposite. Sudden starvation diet in diabetics is dangerous.

A longer rest in bed is a better preparation for cardiac cases. When the examination detects evidence of lessened function of the kidneys a somewhat prolonged rest with restricted diet, increased fluid, and warm baths followed by alcohol rubs undoubtedly diminishes the dangers of post-operative anuria. These are a few of the more general conclusions of surgeons throughout the world. Unfortunately, a detailed study of a large number of cases in any one group, except perhaps diabetes, has not been made.

The point that I wish to emphasize is the importance of more critically examining all patients previous to the operation, with the idea in view of selecting certain patients for special preparation.

Tumors

The chief literature of the year is interested more in the experimental side of tumors than the practical. Mumford (*Annals of Surgery*, January, 1909, vol. xlix, p. 1) contributes a very interesting article on studies of cancer, historical and critical. James Ewing (*Archives of Internal Medicine*, 1908, vol. i, p. 175) presents the cancer problem with its more important literature probably better than any other among the recent contributions.

These experimental investigations, on account of the mystery still attached to most of the questions, excite universal interest; and the hope that they may reveal the etiology and non-operative treatment of malignant tumors justifies almost any expenditure of money and human energy.

I shall not discuss this literature. At the present time we are apparently no nearer the solution of the problem. Even the hæmolytic diagnosis of malignant disease is not established. The practical side of the treatment of cancer is to a certain extent neglected in recent literature. It is this phase of the question that I wish to present.

At the present time surgery offers the only practical cure for malignant disease. Facts resting upon indisputable proof show that a certain number of cancers and sarcomata have not recurred a number of years after their complete excision.

Unfortunately, there is, in the majority of cases of malignant disease, a remoteness between the time of onset and the date of death which has a deleterious effect in its influence upon prompt treatment. My experience makes me feel that if malignant disease were more acute in its clinical course, patients would come for surgical treatment earlier. There are other factors which tend to influence the public and the general profession against earlier operative intervention. The truth of my statement that malignant disease has been eradicated permanently by operation is questioned by many physicians and by the majority of the public. In the past, and even to-day, the operative treatment is not properly performed by all surgeons. The bad results of surgery receive greater attention and produce a more permanent impression than the good results.

All tumors are not malignant, and for these delay does not increase the dangers. All surgeons have not trained themselves to differentiate between the benign and malignant, and for this reason they not infrequently fall into the error of performing mutilating operations for benign lesions, and *vice versa*.

The accumulated experience with the results in the large clinics of the world are, to a certain extent, available to-day. In some these results are better worked out than in others. In this country, unfortunately, very few large surgical clinics have made a careful computation of what they have actually accomplished in the operative treatment of malignant disease.

It is important, therefore, for those who have had a sufficient experience of their own and a knowledge of the literature to take every opportunity to bring forward the facts which I have just mentioned with the hope that it will result in encouraging the public and educating the profession to look upon tumors as an acute disease the treatment for which must be immediate and proper eradication.

The literature discussing the newer non-operative treatment of tumors, for example the X-ray, radium, and the various sera, has unfortunately had a bad effect; and I think most surgeons will agree that it has influenced patients and physicians to attempt these methods of treatment in operable lesions and naturally put off the method of treatment which undoubtedly at the present time promises the best assurance of a permanent cure.

For inoperable malignant tumors it is justifiable to attempt any and every measure with the hope of giving these patients some comfort and perhaps permanent relief.

In operating upon tumors the surgeon, if he desires to accomplish the best permanent results and to perform extensive and mutilating operations only when indicated, must have a knowledge of the pathology and variability in the malignancy of the different forms of new-growths.

In all the benign and in some of the very early forms of the malignant tumors, local removal with only a small zone of unaffected tissue is sufficient. The object of operating upon a benign tumor in the majority of cases is to find out at the operation whether the tumor is malignant or not. It is not always possible to make the differential clinical diagnosis. The tumor must be exposed. There is a second reason for the prompt removal of a benign tumor. Many of these neoplasms become malignant. Their excision in the benign state is prophylactic.

In the more malignant of the malignant neoplasms the extent of the operation varies with the situation and nature of the growth. At the present time the consensus of opinion among surgeons whose experience and results make it authoritative, is uniform in regard to the extent of the operation. In many of these operations the personal equation plays a large part. These dissections require a longer time than the ordinary operation, and I am quite positive that permanent results frequently depend upon the utmost care not only as to the extent, but in the minute details of the dissection.

EPITHELIAL TUMORS OF SKIN AND MUCOUS MEMBRANE.—In *INTERNATIONAL CLINICS* for April, 1904 (vol. i, series 14, p. 243), I have discussed and illustrated the less malignant forms of epithelioma—the basal epithelioma of Krompecher which may occur as a wart, fungus, or ulcer; and the less malignant spindle-cell epithelioma—the warts and papillomata. In *INTERNATIONAL CLINICS* for April, 1907, vol. i, series 17, p. 269), I have again referred to these more innocent epithelial growths and have also discussed and illustrated some of the more malignant forms. Last year there were illustrated and mentioned the ulcers of inflammatory origin which must be distinguished from carcinoma.

A knowledge of these benign and less malignant epithelial growths for which local excision is sufficient allows the surgeon to eradicate the disease with an assurance of a permanent cure without mutilation; but in the same regions—the face, the nose, the eyelid, the lip, the tongue, the skin of the extremities, and the penis—the more malignant carcinoma may arise.

For these the local dissection must be greater in extent and, in addition, there must be a removal, in continuity, of the lymphatic glands, the vessels, and the tissues surrounding them. The extent of this area is based upon the knowledge of the lymphatic anatomy, the clinical records of the actual extent of carcinoma, and the results of treatment.

In the majority of cases the differential diagnosis is not difficult. Figs. 1 and 2 (Plate I, *frontispiece*) illustrate a carcinoma spinocellulare occurring as a fungous tumor on the hand. The surface of this fungus in Fig. B and the section in Fig. A illustrate the characteristic appearance of the most malignant form of carcinoma arising from the squamous epithelium of the epidermis.

This case allows one to use it as an example in the discussion of the two most important questions in the treatment of malignant tumors: the early removal and the proper operation for carcinoma arising in the skin of the extremities. This patient is a male aged seventy-four, and for a number of years has observed on the skin of his hand slightly elevated scaly areas (senile keratosis). About two years ago one of these areas became larger, and when he removed the scab there was a small ulcerated surface; and now he noticed that the ulcerated surface became elevated above the surrounding epidermis. This was the time for excision, and if it had been performed then, local excision would have been sufficient. Although carcinoma of the upper and the lower extremity is relatively infrequent, there are a number of cases of epithelioma beginning in warts or areas of senile keratosis which have been permanently cured by local excision. But when the tumor has been allowed to grow and assume the appearance shown in the illustration, cures have been accomplished only when the tumor has been widely excised and the neighboring lymphatic glands in the groin or axilla removed.

It seems strange that surgeons who practice extensive operations

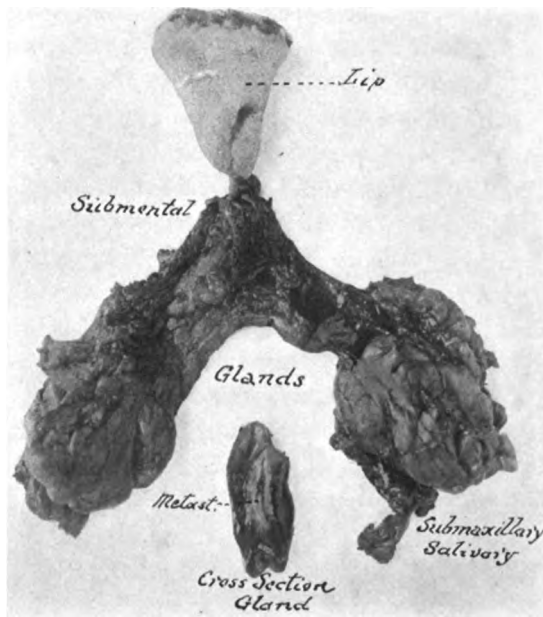
for carcinoma of the breast, lip, and tongue have for some unaccountable reason not carried their principles to carcinoma of the extremities. Some two years ago a number of publications from German clinics brought out this fact and demonstrated the better results after the more extensive operation. My observations in the surgical clinic of the Johns Hopkins Hospital confirm these conclusions. In carcinoma of the extremities when it has assumed the characteristic picture shown in Plate I the most extensive local and gland operation must be performed.

In the skin of the extremities areas of senile, lead, and other forms of keratosis, apparently innocent papillomata, and warts and ulcers which form in the scar tissue of old burns and wounds, must always be looked upon as possible sites for malignant tumors and immediately removed.

In the past there has been a large literature on the epitheliomata of the lip, face, mouth, and tongue. The most recent contribution is by J. Collins Warren of Boston (*Annals of Surgery*, October, 1908, vol. xlviii, p. 481).

Fig. 8 shows the extent of tissue removed from the lower lip and glands of the neck for malignant epithelioma of the lower lip. My own investigations and the published experience of others seem to indicate that in operations upon the lip and cheek the local removal has been sufficient, and the glandular operation insufficient. The chief fault is in the removal of the submental glands. It is impossible properly to eradicate this lymphatic group without sacrificing part of the muscles on each side. In carcinoma of the tongue, floor of the mouth, and cheek, and in all carcinomata of the facial region which have secondarily infiltrated the bone, surgeons have more often erred in restricting their local dissection. Crile of Cleveland has done as much as any surgeon in this country in demonstrating the better results of the more radical local operation and has contributed to the technic of the larger neck dissection by his temporary clamp for the common carotid and his suggestion of removing the internal jugular vein and the sternocleidomastoid muscle. I am not prepared to advocate this procedure in every case. The records which I have at my disposal and my own cases demonstrate that cures have been accomplished in epitheliomata of the lip, floor of the mouth, tongue, and cheek, when the glands in

FIG. 3.



Malignant epithelioma of lower lip and glands of the neck. Photograph of tissue removed.
(Pathol. No. 9284.)

the submaxillary and submental groups have shown metastasis and when the extent of the dissection was not greater than that shown in Fig. 3. But in these cases the primary tumor was small and of comparatively short duration. For the larger local growths I should follow Crile's plan. However, as a matter of fact, the removal of the sternocleidomastoid muscle is but a slight disfigurement; the temporary clamping of the common carotid and the removal of the internal jugular vein undoubtedly facilitate the dissection of the neck. This more extensive dissection is a move in the right direction.

G. Lenthal Cheatele (*Practitioner*, November, 1905; December, 1906; August, 1907) contributes three very interesting papers on the spread of carcinoma in the tongue, at the angle of the mouth, and in the upper lip. These studies confirm my statement with regard to the local and glandular operation in these areas.

BENIGN AND MALIGNANT PIGMENTED MOLES.—In *INTERNATIONAL CLINICS* for April, 1905 (vol. i, series 15, p. 238, Figs. 6, 7, 8) I have discussed the benign moles with some illustrations in contrast to the malignant tumors which arise in them (*ibid.*, Figs. 1, 2, 3, and 4). At the present time the pigmented mole is looked upon as an epithelial tumor. The islands of subepidermal pigmented cells are apparently misplaced from the epidermis in early embryonic life. The malignant tumor, therefore, arising in a congenital pigmented mole should be called a carcinoma. The benign and malignant pigmented moles are so strikingly different from other epithelial tumors, on the one hand, and connective-tissue tumors, on the other, that they must be studied in a group by themselves. Adami in his recent book on the "Principles of Pathology" (vol. i, p. 759) groups the benign and malignant tumor under the term melanoma, and apparently is not willing to accept Unna's view that they are of epithelial origin.

Irrespective of their real origin, we are confronted with the evidence that when the congenital pigmented mole becomes malignant the cell activity in the local growth is so quickly followed by wide-spread dissemination, certainly through the lymphatics and apparently also through the blood-vessels, that the disease is incurable. I have been unable to find an authentic example of a permanent cure, although the duration of life may be prolonged, in exceptional cases, to three and five years.

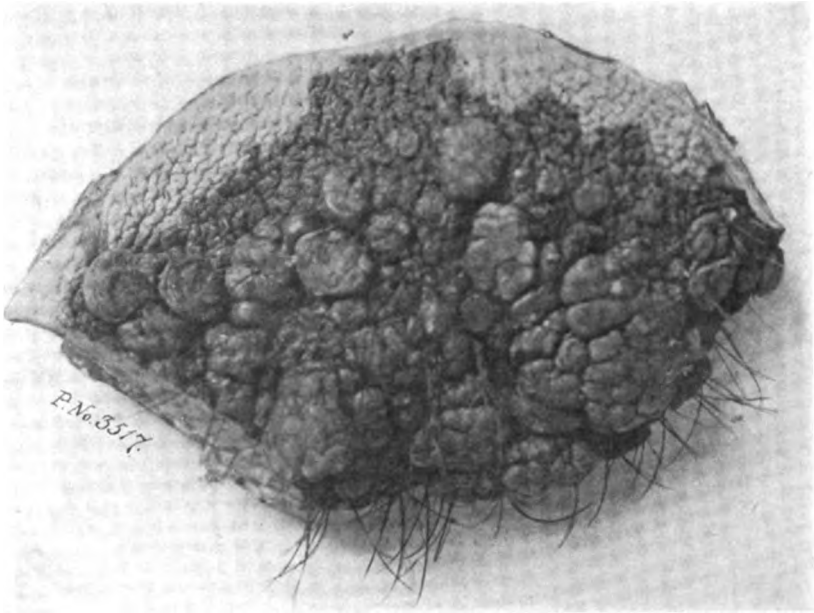
Local growth in a benign pigmented mole is not always a sign of malignancy. Figs. 4 and 5 illustrate such an example. Histologically, in this case there is chiefly a connective-tissue growth. The photograph of this huge mole on the back I have published before (INTERNATIONAL CLINICS, vol. i, series 14, April, 1904, page 238, Fig. 7). I have observed other examples of this local growth in which the patients have remained well after local excision. The consensus of opinion at the present time favors the removal of all congenital moles of large size or situated in positions in which they are subjected to trauma, and immediate excision of all moles which show any evidence of growth or ulceration. Gibbon and Despard (INTERNATIONAL CLINICS, Oct., 1908, vol. iii, series 18, p. 75) report a number of cases of malignant "melanotic neoplasms." Their first case, illustrated in their Figs. 1 and 2, resembles in its huge growth the one portrayed here in my Fig. 4. The patient was a white girl aged seven; at birth, similar to the observation in my patient, the congenital mole was small and it has grown in seven years from about 1 to 9 inches in diameter. From the pathological report in this case it was looked upon as a melanotic mixed-cell sarcoma. At the time of the report the patient was still free from evidence of recurrence. From reading the pathologic description I would question the diagnosis of a malignant tumor and look upon the new growth as benign. Further observation in this case will determine this question. In this paper there are a number of other interesting cases with good photomicrographs, one of which is of especial interest—a malignant pigmented mole situated in the rectum just above the sphincter.

Figs. 6 and 7 illustrate the microscopic picture of the benign pigmented mole.

BENIGN AND MALIGNANT CONNECTIVE-TISSUE TUMORS.—In the following I will give a few illustrations of cases which I have observed to demonstrate the proper conception upon which the operative treatment for sarcoma should be based.

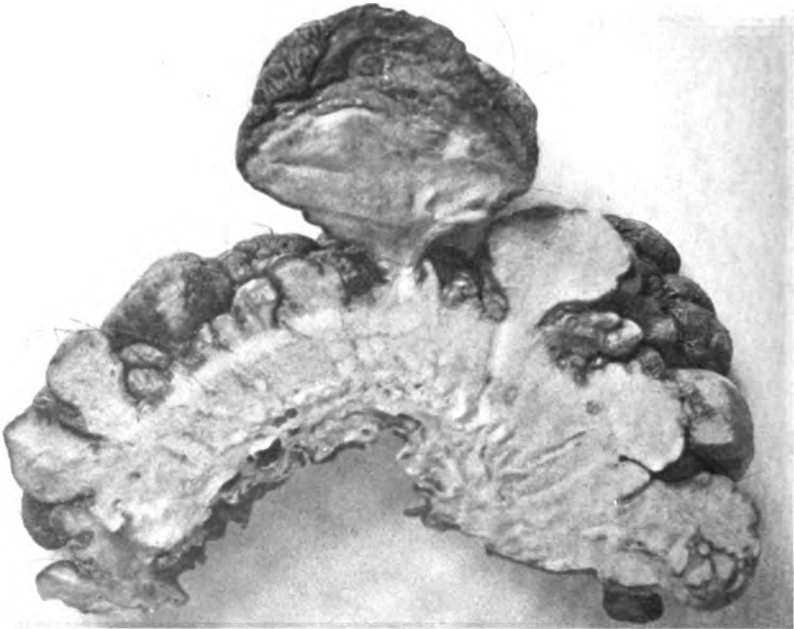
Fig. 8 is a photograph of the actual amount of tissue removed *en bloc* from the thigh to illustrate an attempt to accomplish a cure in the more malignant form of sarcoma. This was done, because the more extensive dissection did not involve any more mutilation than the less extensive one. The tumor was situated in the lower

FIG. 4.



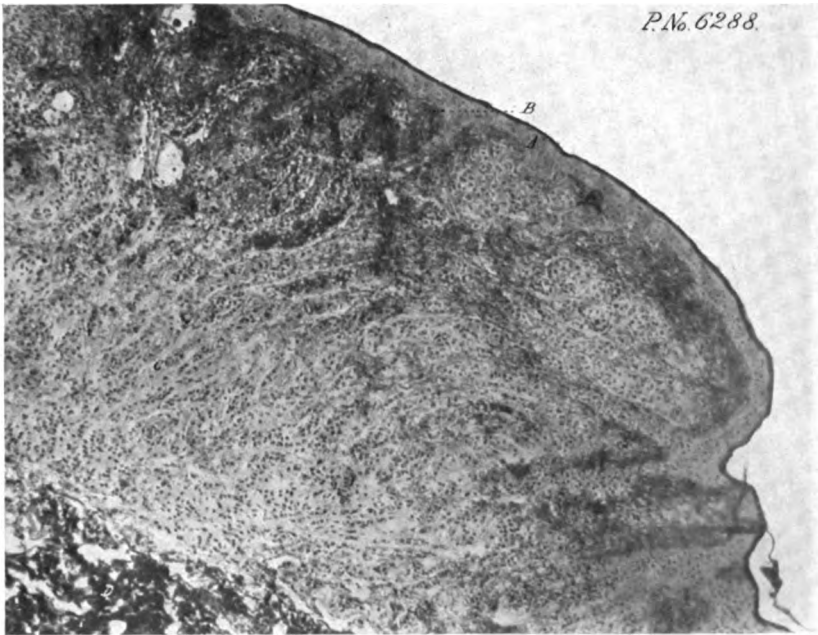
Edge of specimen to illustrate growth from a small, flat, pigmented area to a pedunculated lobular tumor.

FIG. 5.



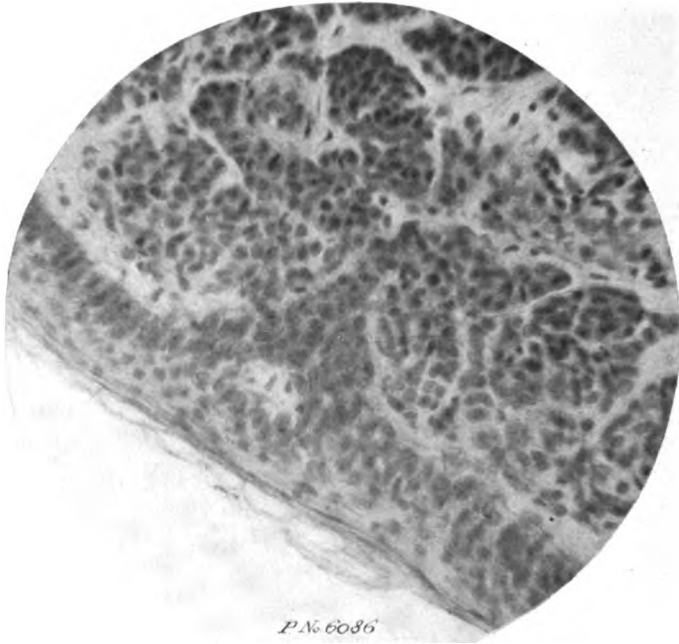
Cross-section through pigmented mole in Fig. 4. to illustrate the pigmented zone beneath the epidermis, the different sizes of the lobular outgrowths, and that the new-growth is due to a connective-tissue hypertrophy (elephantiasis) and not to the special epithelial cells of the pigmented mole.

FIG. 6.



Photomicrograph of congenital pigmented mole. *A*, epidermis; *B*, subepidermal pigmented epithelial cells of the basal type; *C*, deeper growth of subepidermal pigmented basal cell; *D*, connective tissue. (Pathol. No. 6288.)

FIG. 7.



Photomicrograph of a small congenital pigmented mole to illustrate the apparent communication by continuity between the basal cells of the epidermis and the congenitally displaced subepidermal cells. (Pathol. No. 6086.)

third of the thigh on the medial-lateral surface. It was removed with a zone of skin and then all the subcutaneous tissue between this and Poupart's ligament, including the fascia of the muscles, was removed in one piece. That the patient has remained well now eight months since operation cannot be looked upon as yet as a positive cure. Plate II, Fig. B, is selected to show a second variety of mixed sarcoma. This tumor arises in the myxomatous tissue of the nerve sheath, in the periductal myxomatous stroma of the breast, and is very common in the region of the nose and upper and lower jaw. In addition to the cellular portion, there is fibrous and myxomatous tissue.

With few exceptions the round-cell sarcoma kills by metastasis. It is often difficult to distinguish with the microscope whether these round cells originate from the fixed connective-tissue cells, or from the endothelial or perithelial cells of vessels. In looking over my cases of round-cell sarcoma a few are distinctly of the perithelial type (INTERNATIONAL CLINICS, vol. i, series 15, April, 1905, p. 298, Fig. 28), and a few are distinctly endotheliomata. Among these tumors, some twelve in number, I have observed but one cure. Figs. 9 and 10 picture the gross and microscopic pathology of this tumor. When compared with the gross and microscopic appearance of the cases which have not been cured (Figs. 11, 12, and 13), very little difference is seen. It is such observations that encourage one to give every patient with an operable sarcoma of the more malignant variety a chance by complete eradication. However, the extensive local excision demanded for carcinoma is not necessary here, because in the case illustrated in Fig. 9 amputation was not performed, and the patient, now living eleven years after operation, has a useful arm.

BONE TUMORS.—In INTERNATIONAL CLINICS for April, 1905 (vol. i, series 15), I began the presentation of the subject of bone tumors and illustrated (*ibid.*, Fig. 18) a cured case of periosteal giant-cell sarcoma of the lower end of the ulna in which the tumor had been removed by resection, and a medullary giant-cell sarcoma of the upper end of the tibia in which the new-growth had been removed with the curette. In INTERNATIONAL CLINICS for April, 1908 (vol. i, series 18, p. 268), Figs. 10, 11, 12, and 13 picture a

giant-cell sarcoma of the lower end of the radius which had recurred twice after an incomplete local operation, and has now remained free from recurrence since the last complete operation, at which the arm was not sacrificed.

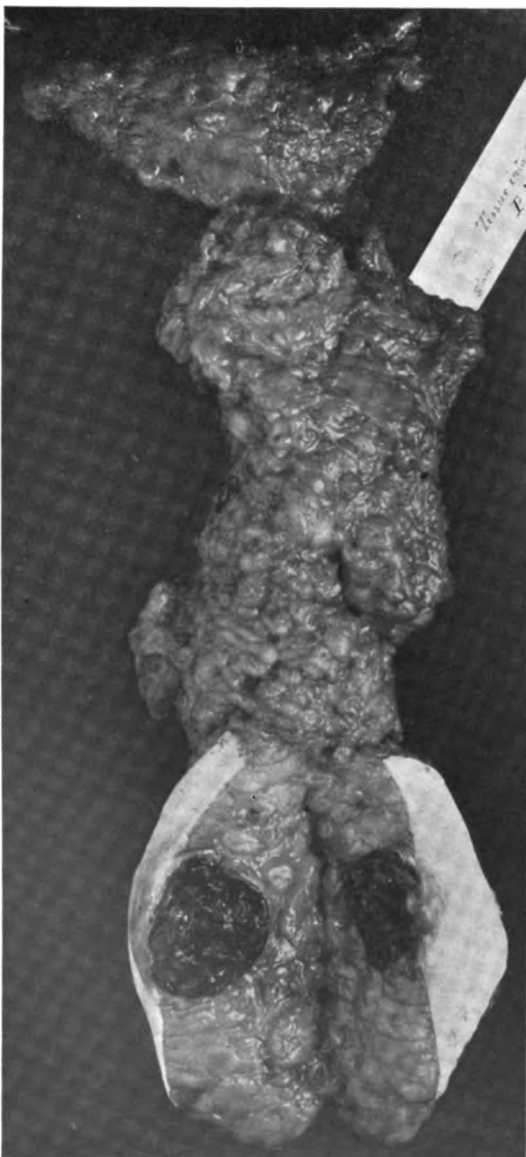
The giant-cell sarcoma is perhaps the most common bone tumor, but all sarcomata of bone which contain giant cells are not giant-cell sarcoma. The true giant-cell sarcoma (Figs. 18 and 19) has a characteristic gross and microscopic appearance.

Adami groups under *bone-marrow tumors*, using the term *myeloma*, this giant-cell sarcoma, which he calls the *giant-celled myeloma*. He also places here the myeloma multiplex, designating this condition as *myelomatosis*. I have illustrated and discussed this tumor (INTERNATIONAL CLINICS, April, 1907, vol. i, series 17, p. 275, Fig. 21). Christian of Boston (*Transactions of Ass. of Amer. Physicians*, xxii, 1907, p. 145) has collected a number of cases and gives the best recent cellular description. The most important diagnostic sign in this disease is the presence of Bence-Jones bodies in the urine. Now and then this multiple myeloma may appear clinically as a single primary bone tumor. If one makes it a routine rule to examine the urine in every case of bone tumor, this disease will be recognized and an unnecessary operation avoided. Two other bone-marrow tumors are included by Adami—one of these is the myelogenous leukæmia, and the other, chloroma. These two lesions would never be mistaken for a primary bone tumor.

The term osteosarcoma should be used in the same sense as fibro- and myxosarcoma, to designate a tumor in which there is new formation of bone, but in which between the bone lamellæ the tissue is that of a true sarcoma. These tumors are comparatively less malignant than the other periosteal and medullary sarcomata of bone. In cases which I have observed there have been no metastases. These tumors can usually be diagnosed from the X-ray, but in some instances it may be difficult to differentiate them from the strictly benign lesions, ossifying periostitis of luetic origin and ossifying myositis.

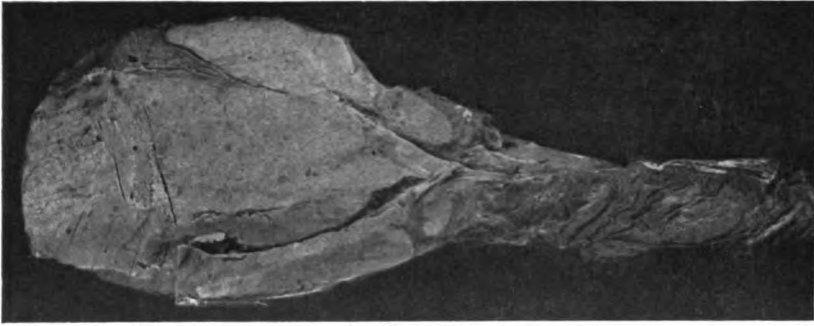
The chondromyxosarcoma of bone shows a variability in its malignancy similar to that observed in the myxosarcoma of nerve-sheaths which has been described (Plate II, Fig. B).

FIG. 8.



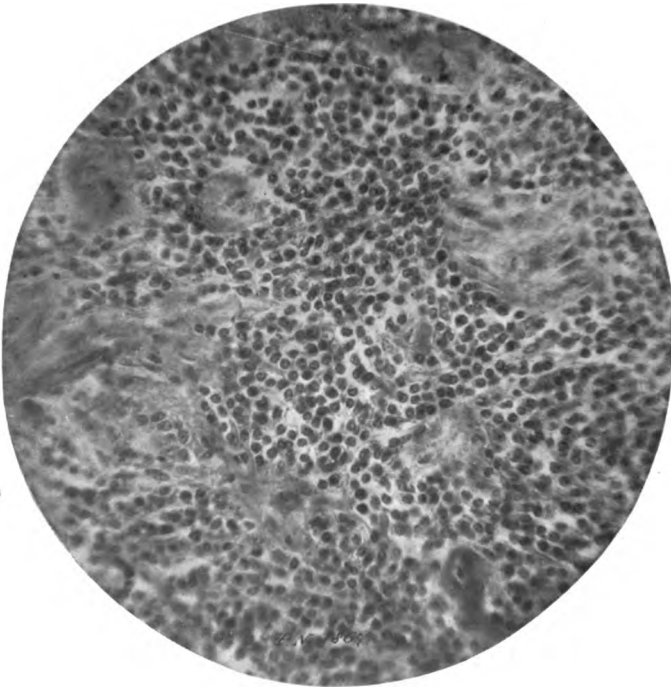
Female aged fifty years : tumor, skin of thigh, three years, vascular spindle- and round-cell sarcoma. Photograph to illustrate the excision *en bloc* of tumor, fat, and glands below Poupart's ligament. (Well eight months). (Pathol. No. 9063.)

FIG. 9.



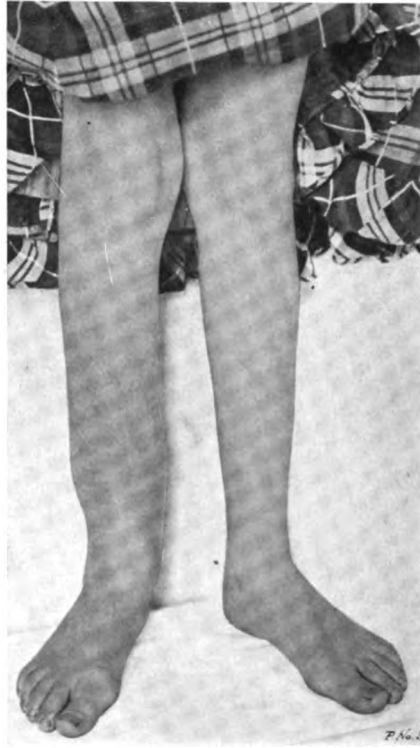
Small round-cell sarcoma; cells of lymphoid type. Tumor situated between superficial and deep flexor muscles of the forearm, infiltrating muscle, in a colored girl aged eighteen years, tumor of slow growth and ten years' duration. Well eleven years after operation. Photograph of section through alcohol specimen. (Pathol. No. 1867.)

FIG. 10.



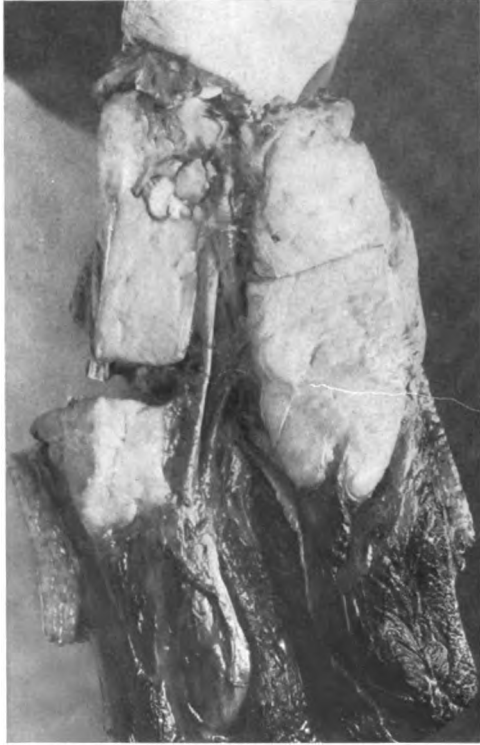
Photomicrograph of tumor shown in Fig. 9. The tissue between the lymphoid cells is striated muscle undergoing degeneration. (Pathol. No. 1867.)

FIG. 11.



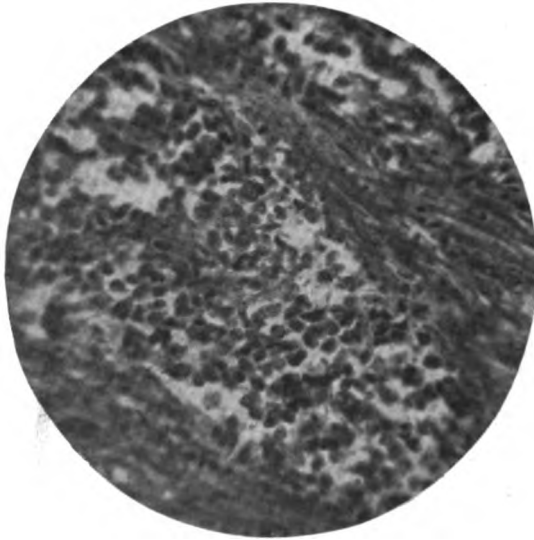
Small round-cell sarcoma; cells of the lymphoid type. Intermuscular tumor in the calf of the leg in a white girl aged nine years; tumor seven months. Death from internal metastasis five months after amputation. (Pathol. No. 3016.)

FIG. 12.



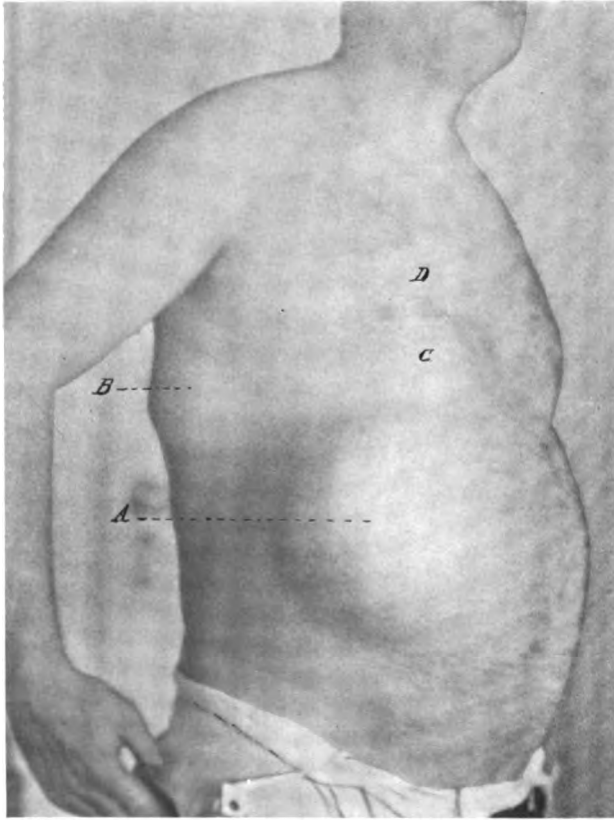
Photograph of section through tumor illustrated in Fig. 11. This is the fresh appearance; the tumor is opaque white, finely granular, with a milky secretion. Fig. 9 had a similar fresh appearance. (Pathol. No. 3016.)

FIG. 13.



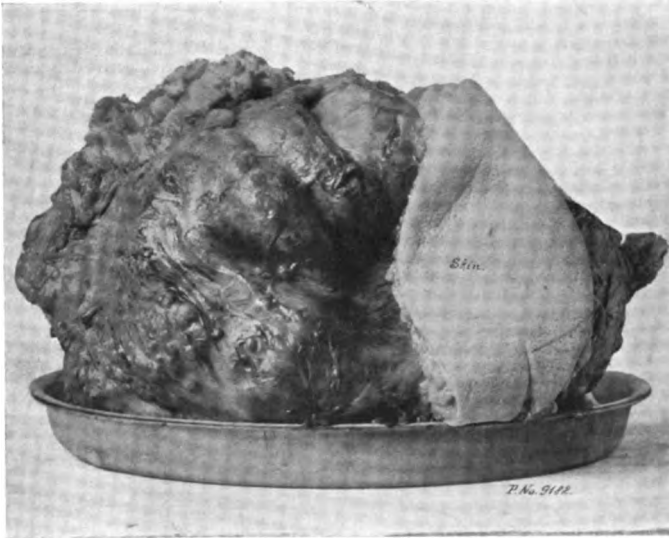
Photomicrograph of section of tumor shown in Fig. 12. Note the remains of muscle tissue between the round cells. (Pathol. No. 3016.)

FIG. 14.



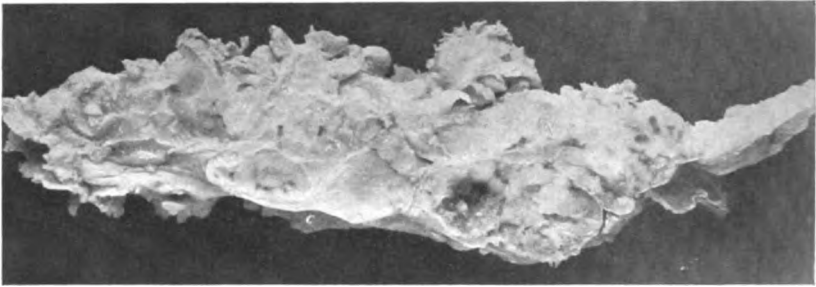
Multiple chondromyxoma of ribs. Male aged 50 years, larger tumor (A) ten years, smaller tumors (B, C, D) one year. (Pathol. No. 9182.)

FIG. 15.



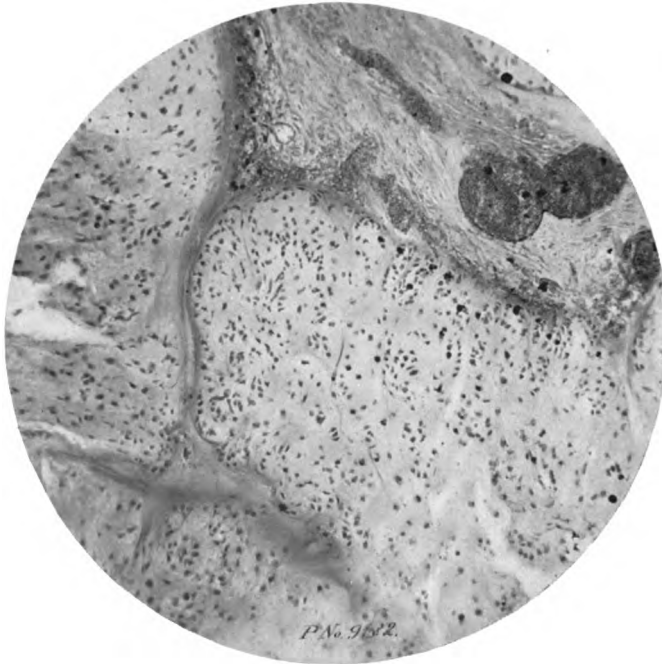
The gross appearance of the removed tumor shown in Fig. 14. Note the distinct encapsulation of the tumor and its lobular surface. (Pathol. No. 9182.)

FIG. 16.



Section through the wall of tumor in Fig. 15, *C*, capsule. Within the capsule there are lobules of cartilage and myxomatous tissue separated by a thin connective-tissue septum. (Pathol. No. 9182.)

FIG. 17.



Photomicrograph of tumor shown in Fig. 16. Compare with photomicrograph in INTERNATIONAL CLINICS, April, 1908, vol. i, series 18, page 268, Fig. 15. (Pathol. No. 9182.)

Figs. 14, 15, 16, and 17 are illustrations from a recent observation of my own. The larger tumor which was first removed, although of huge size and of at least ten years' growth, was distinctly encapsulated; the wall was composed of cartilage and myxomatous tissue, and there was no histological evidence of sarcoma. However, when I operated on tumor *B* (Fig. 14) I found in the muscles outside of the tumor proper an infiltration having the gross appearance of a cellular sarcoma, and this infiltration extended to the diaphragm, pleura and lung. The patient ultimately succumbed to the disease. Here we have a definite example of what apparently was, in the beginning, a multiple benign tumor. One tumor has later taken on a definite malignant growth. The pure myxoma of bone is a relatively rare tumor (*INTERNATIONAL CLINICS*, vol. i, series 18, April, 1908, p. 268, Fig. 15), but I have observed one case in which the patient has remained well, although there were three operations for local recurrence.

BONE CYSTS.—The benign bone cyst is not difficult to recognize at the exploratory incision. Although the contents may be slightly blood-stained it has never been hemorrhagic. This tumor was fully discussed in *INTERNATIONAL CLINICS*, vol. i, series 18, April, 1908, p. 264. Milner (*Deutsche Zeitschr. f. Chir.*, 1908, vol. xciii, p. 328) brings the subject up to date with historical and critical notes on bone cysts, chondromata, fibrous osteitis, and kindred diseases. In view of our definite knowledge based upon such a large number of bone cysts one should be very suspicious if at the exploratory incision one finds in a tumor of bone a cavity filled with blood. In two cases of which I have records the wall of these hæmatomata was formed of sarcomatous tissue (Figs. 18 and 19).

HODGKIN'S DISEASE.—Although at the present time we know of no means which will check the inevitable fatal result in this disease, nevertheless it is important to be able to recognize it in the differential diagnosis from other glandular enlargements. In the majority of instances the first glands to be involved are those of the neck. There are but two positive methods of diagnosis: a blood-count and a microscopic examination of a removed gland. In Hodgkin's disease there is nothing in the blood-count at all significant, but in leukæmia, which may begin with glandular enlargement the blood-picture makes the diagnosis.

The histologic picture of Hodgkin's disease described by Dorothy Reed in 1902 (*Johns Hopkins Hospital Reports*, x, 1902, p. 133) has been accepted by most authorities. Adami (*loc. cit.* p. 683) writes: "To speak of Hodgkin's disease as a form of lymphosarcoma, or as a lymphomatosis, is absolutely unjustifiable. It approaches more nearly the results of chronic irritation."

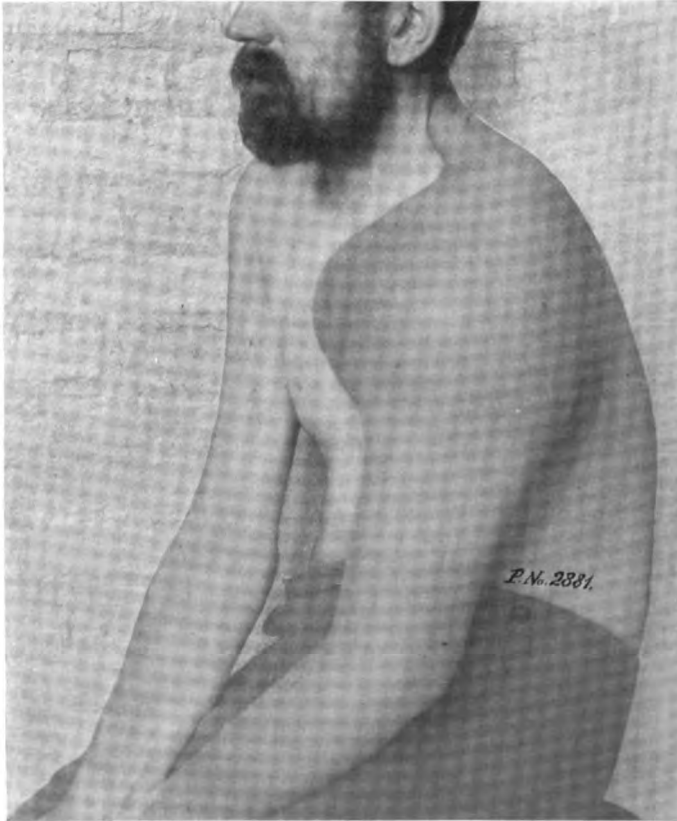
Coley, on the other hand (*Surgery, Gynecology, and Obstetrics*, 1908, vol. vi, p. 649) supports the theory that Hodgkin's disease is a type of sarcoma.

The point that I wish to bring out is that multiple glandular enlargements of the neck may be due to various causes, and an immediate diagnosis is possible either by an examination of the blood or by a histological examination of one of the glands, which can be removed under cocaine local anæsthesia. No harm can be done in removing such a gland, because in the hopeless lesions, Hodgkin's disease and lymphosarcoma, such an exploratory and partial operation does not make the disease any worse. One would never overlook an operable carcinoma with metastasis to the glands of the neck, axilla, or groin. So this possibility need not be considered here. However, it is important to state that the exploratory removal of a gland in the neighborhood of a carcinoma for diagnostic purposes is now considered, from sufficient evidence, to be unjustifiable. The histologic picture of lymphosarcoma—a very rare disease—has been described by MacCallum. Among the other possible lesions which appear as multiple tumors of the neck are aberrant thyroid, multiple lymph-cysts, tuberculosis of glands, and the forms of acute and chronic lymphadenitis. In these diseases no harm results from the removal of a single gland for diagnosis.

The removal of such a gland, when the blood examination is negative, allows one to distinguish at once between the curable and incurable lesion. The gross and microscopic picture of aberrant thyroid has already been illustrated (*INTERNATIONAL CLINICS*, vol. i, series 17, April, 1907, p. 277, Figs. 24 and 25). For the microscopic appearance of Hodgkin's disease and lymphosarcoma I would refer to the papers of Reed and of MacCallum (*loc. cit.*).

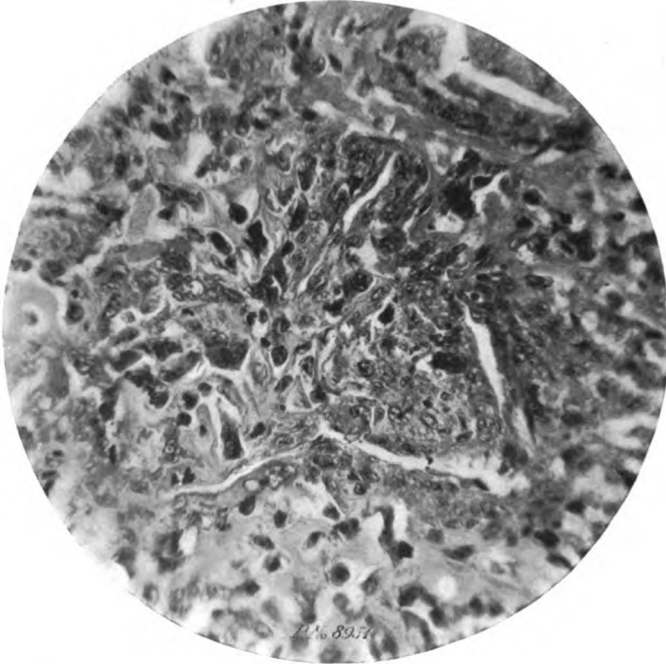
Figs. 20 and 21 illustrate the clinical and gross appearance in a somewhat advanced case of Hodgkin's disease.

FIG. 18.



Mixed spindle- and round-cell sarcoma with a few giant cells; medullary tumor of upper third of humerus; rapid growth due to a hemorrhage forming a blood cyst. White male, aged 32 years; pain without tumor four years; rapid formation of the swelling shown in the photograph directly after trauma six months ago. Exarticulation with scapula. Death from internal metastasis two and a half years later. (Pathol. No. 2881.)

FIG. 19.



Photomicrograph of spindle- and round-cell sarcoma with few giant cells. Medullary tumor of lower shaft of humerus in a male aged 21 years. The swelling first appeared in the soft parts four months ago after a trauma and at the exploratory incision was first looked upon as a hæmatoma. (Pathol. No. 8951.)

FIG. 20.



Hodgkin's disease. White boy aged 14 years; glandular swellings four years. Death two years and six months after excision of glands. (Pathol. No. 6621.)

FIG. 21.



Photograph of section through glands shown in Fig. 20. (Pathol. No. 6621.)

It is rather interesting to note that, although the literature from 1904 to 1906 has numerous references to the X-ray treatment of Hodgkin's disease, very little appears in 1907 and 1908. I think this is due to the fact that a great number of physicians are not familiar with the natural history of this disease. The average duration of life is from five to ten years from the onset, and during this time the glandular enlargements may, without treatment, become smaller or even entirely disappear. Whether the X-ray has any positive influence is difficult to estimate, but I am unable to get the record of a positive cure from the X-ray or any other method of treatment. When the glands are enlarged, as shown in Fig. 20, it gives comfort and relieves the patient of the mental anxiety caused by the swellings, to have them removed. But one should never, with our present knowledge, inform the family that removal of the glands in Hodgkin's disease ever accomplishes a cure.

Surgery of the Breast

In *INTERNATIONAL CLINICS* for April, 1907 (vol. i, series 17, p. 275), and for April, 1908 (vol. i, series 18, p. 272), I have presented my own views with a discussion of some of the literature. Since then there has appeared, in vol. ii of "Gynæcological and Abdominal Surgery," edited by Kelly and Noble, a chapter on diseases of the female breast.

It is my opinion that the differential diagnosis of doubtful tumors of the breast must be made at the operation, either from the naked-eye appearance of the exposed tumor or from a rapid frozen section. I believe there is sufficient evidence to show that operation for carcinoma in two stages rarely accomplishes a cure.

On exploring a doubtful tumor of the breast and finding a cyst, the differential diagnosis as a rule can be made from the contents of the cyst or the character of its wall. The following is an extract from my chapter on diseases of the breast in the Kelly-Noble book.

"**CANCER CYSTS.**—These are the most infrequent tumors of the breast—2.7 per cent. of all cases. Fifty per cent. have been clinically doubtful and exploratory incision had to be made; and it is very important to note that in all except one the diagnosis was not made, but only the cyst was excised, and later, upon microscopic

examination of the wall of the cyst, a cancer was recognized and the complete operation performed.

"Only one of these cases is living, and as there is no pathologic report, the correct diagnosis may be questioned.

"**CYSTIC TUMORS OF THE BREAST.**—The recognition, at the exploratory incision, of the solid tumors of the breast, has been fully discussed, and, on the whole, is less difficult than of the cystic variety. It seems best to review here the differential diagnosis, at the exploratory incision, of the various cystic tumors.

"First, a cyst containing blood without a papilloma to explain the hemorrhage has, in my experience, always been cancer. A cyst containing thick, grumous material has always been cancer. This material is due to broken-down epithelial cells.

"The possible benign cysts of the breast are as follows:

"The galactoceles have a thin, smooth, distinct wall containing milk, and are surrounded by lactating breast. The circumscribed chronic abscess—a rare lesion in the lactating breast—has a thick wall lined by vascular granulation tissue and contains purulent material. This cyst will be most difficult to differentiate from the cancer cyst in the lactating breast. The walls look very much alike, but the contents of the cancer cyst are thicker and more granular.

"The simple cyst has a smooth wall and thin, clear or cloudy, serous contents. I have never observed it to be hemorrhagic. The cyst containing a benign papilloma may contain blood. This can be distinguished, however, from the malignant papillomatous cyst by the changed appearance of the growth, projecting from the wall.

"A careful review of my notes and the specimens of cancer cysts demonstrate that their contents have been either bloody, or thick, granular material, that the wall is either thicker and more intimately adherent to the surrounding breast tissue than the benign cyst, and when, in a few instances, the wall has been found thin, a definite thickening could be palpated in some part of it, which on incision had the appearance of cancer.

"In a sarcomatous cyst sent to me by Pancoast the cyst wall was lined by a friable, cellular tissue which would at once exclude a benign cyst.

"In the fifth cancer cyst admitted to the surgical clinic, clini-

cally doubtful, Prof. Halsted made the correct diagnosis at the exploratory incision from its bloody contents and from a palpable tumor in the smooth wall of the cyst. The complete operation was immediately performed. The axillary glands showed metastasis. This patient has remained well for the two years and six months which we were able to follow her after the operation.

"The other clinically doubtful cancer cysts were received in the laboratory from outside sources.

"I have recently observed two simple cysts in girls under twenty. Both followed traumatism. In one the fluid was slightly brown, but not definitely hemorrhagic; in both remains of an epithelial lining could be made out.

"A lymphatic cyst, or a cyst due to a tubercular abscess, similar to those observed in the thigh, is possible. I have, however, never observed such a case, nor do I find any in the literature. The hydatid cyst and the benign and malignant dermoids have been discussed."

The case illustrated in Plate II, A, and Figs. 22, 23, 24, 25, and 26 is an example of a distinctly benign tumor—a simple cyst—diagnosed by an experienced surgeon as carcinoma. I am confident that if any mistake is to be made it is better for the patient that it should be of this character. When the woman is of the cancer age all doubtful tumors, clinically or at the exploratory operation, should be treated as malignant. The photomicrographs in Figs. 23, 24, 25, and 26 are very clear microscopic pictures of the changes in the breast observed in cystic disease. I am quite sure that the area seen in Fig. 25 when examined in a rapid frozen section might be looked upon as carcinoma. Figs. 27 and 28 are taken from a recent case of my own, and I specially wish to call attention to Fig. 28, which even in the carefully prepared section suggested at first sight the possibility of carcinoma.

Although minute cysts are present in the case illustrated in Fig. 29, I am quite confident no one would have any difficulty in differentiating this somewhat circumscribed cystic adenocarcinoma from the benign multiple cyst of the breast which is known as Schimmelbusch's disease or chronic cystic mastitis.

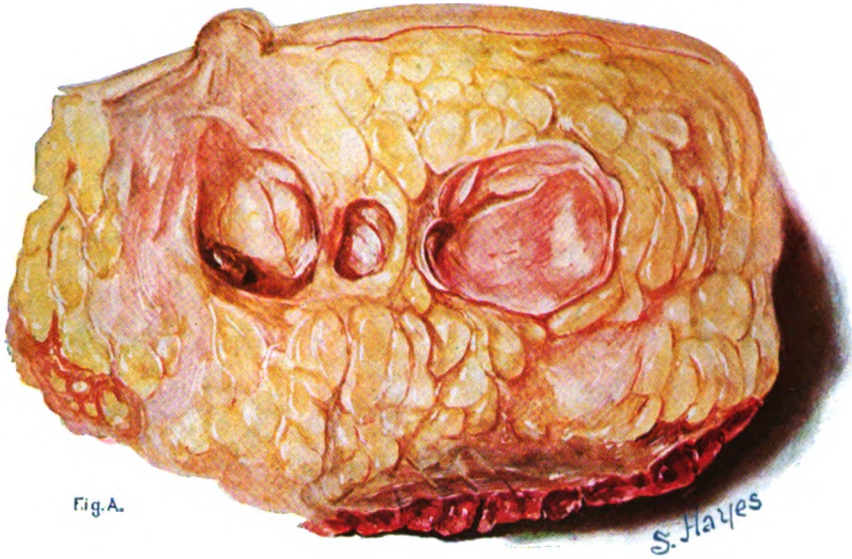
Abdominal Surgery

Without discussing at length in this review the subject of post-operative complications, I might mention very briefly here one of the most interesting of the more recent innovations in the domain of abdominal surgery. It is rather striking that various therapeutic measures which were instituted for the very ill abdominal cases have now been found to give comfort to, and to shorten the convalescence of, the least serious among the so-called laparotomy patients. It seems to me that there are three questions upon which most surgeons now agree. In the preparation for laparotomy the catharsis should be at least forty-eight hours before operation and the diet should be restricted during that time; water can be given freely. After operation, when the wound is closed, the patients can sit up and move about freely in bed. For at least forty-eight hours, and in serious cases longer, salt solution should be given per rectum after the method introduced by Murphy of Chicago.

From my own experience I feel satisfied about these three procedures. Kümmler (*Archiv f. klin. Chir.*, 1908, vol. lxxxvi, p. 494), in his paper before the German Surgical Congress entitled "the Shortening of the Healing Time of Laparotomized Patients by Permitting Them to Get up Early," shows that the German surgeons are adopting the newer methods of their American colleagues.

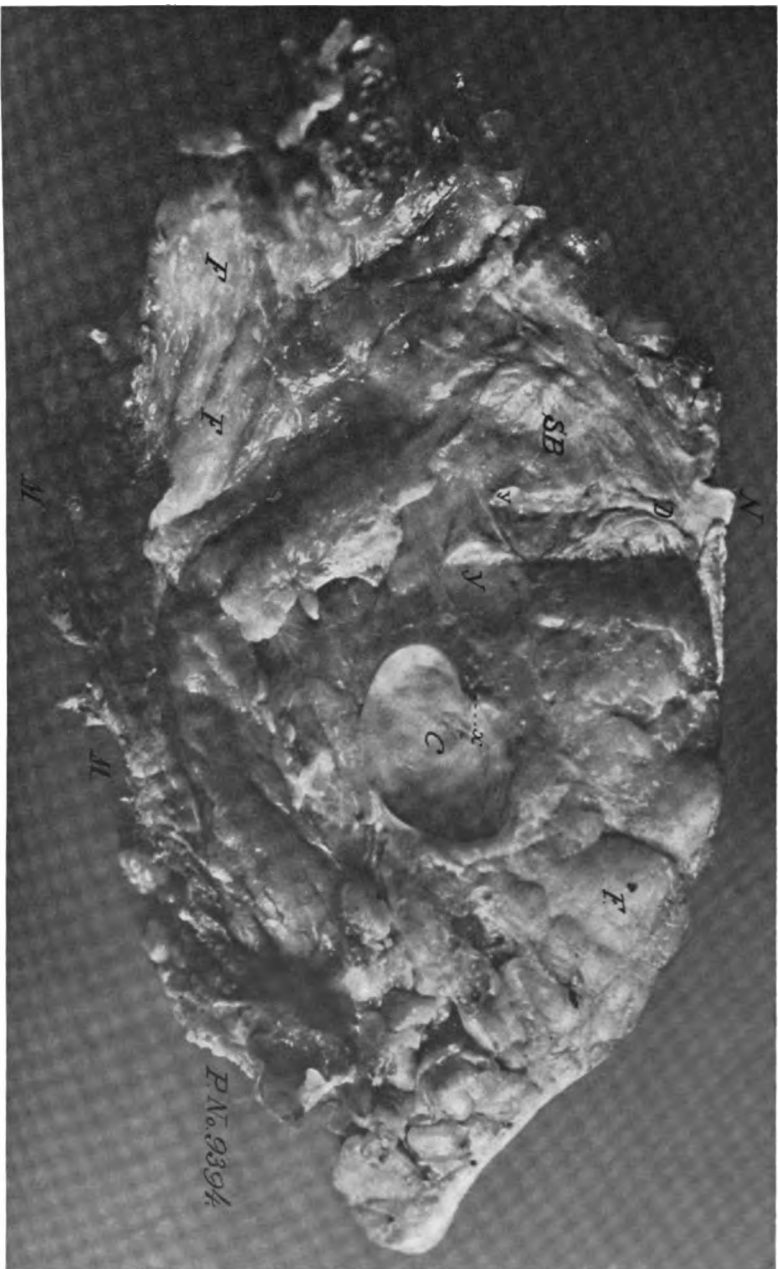
ESERINE.—There has been a great deal in recent literature from different surgeons giving their experience with the hypodermic employment of eserine after laparotomy. The object of this therapeutic agent is to use its physiologic properties in increasing peristalsis and thus aid the intestines in evacuating gas per rectum. Dr. Preble, who has been the resident surgeon at the St. Agnes Hospital during the last eighteen months, has made very careful observations of the cases in which I have employed it. I am not prepared to advise its general use. The chief objection to the employment of eserine is its toxic effects; it must be watched carefully. If one-sixtieth of a grain of eserine is given two hours after operation and repeated again in one hour gas will be evacuated on passing a rectal tube. The employment of eserine in certain selected cases, such as after prolonged operations where one expects intestinal paresis, so far, in my experience, has given uniformly satisfactory results.

PLATE II.



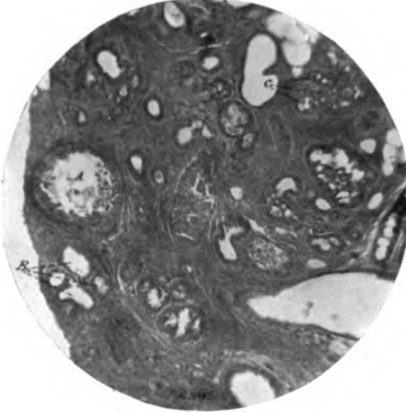
A Colored drawing of breast shown in Fig. 22. B, Sarcoma of the soft parts removed from the popliteal space.

FIG. 22.



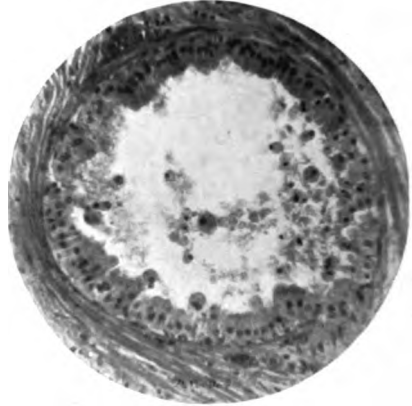
Photograph of specimen shown in Plate I., Fig. A. *C*, the largest cyst, the only one felt at the clinical examination; *x*, minute area 2 by 2 mm. in wall of the cyst showing minute cysts (senile parenchymatous hypertrophy); *N*, nipple; *D*, dilated duct; *SB*, senile breast; *W*, smaller cysts; *F*, fat replacing breast tissue; *M*, pectoralis major muscle. (Pathol. No. 9394.)

FIG. 23.



Photomicrograph of minute area of senile parenchymatous hypertrophy in the wall of the largest cyst (C) shown in Fig. 22 (at x). A, B, C, areas shown under higher powers in Figs. 24, 25, 26. (Pathol. No. 9394.)

FIG. 24.



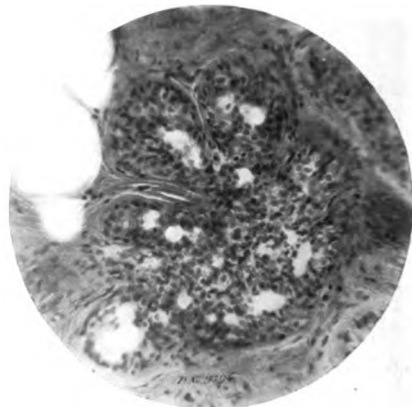
Minute epithelium-lined cysts; cells show proliferation, desquamation, and degeneration. See Fig. 23 at A. (Pathol. No. 9394.)

FIG. 25.



Area of slight ectasia, the second stage of senile parenchymatous hypertrophy. See Fig. 23 at B. (Pathol. No. 9394.)

FIG. 26.



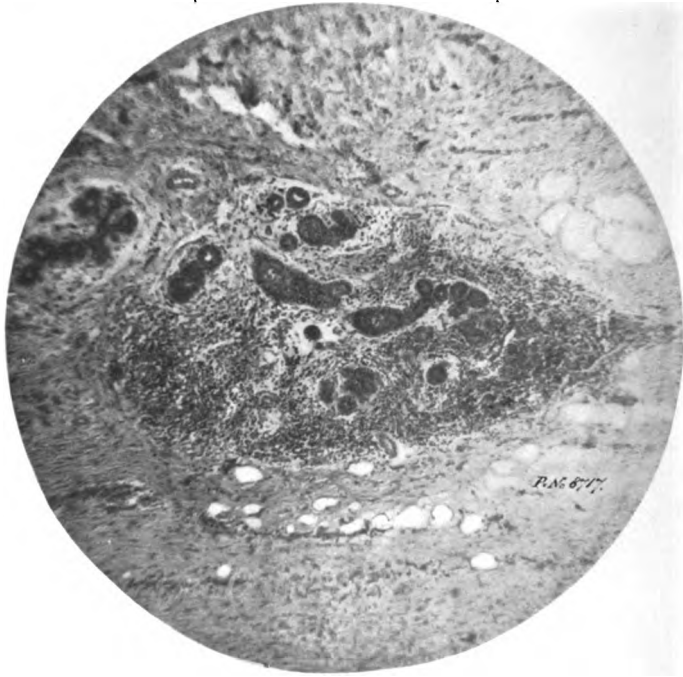
Adenocystic areas. The acini are filled with masses of epithelium. This picture resembles that in Schimmelbusch's disease. See Fig. 23 at C. (Pathol. No. 9394.)

FIG. 27.



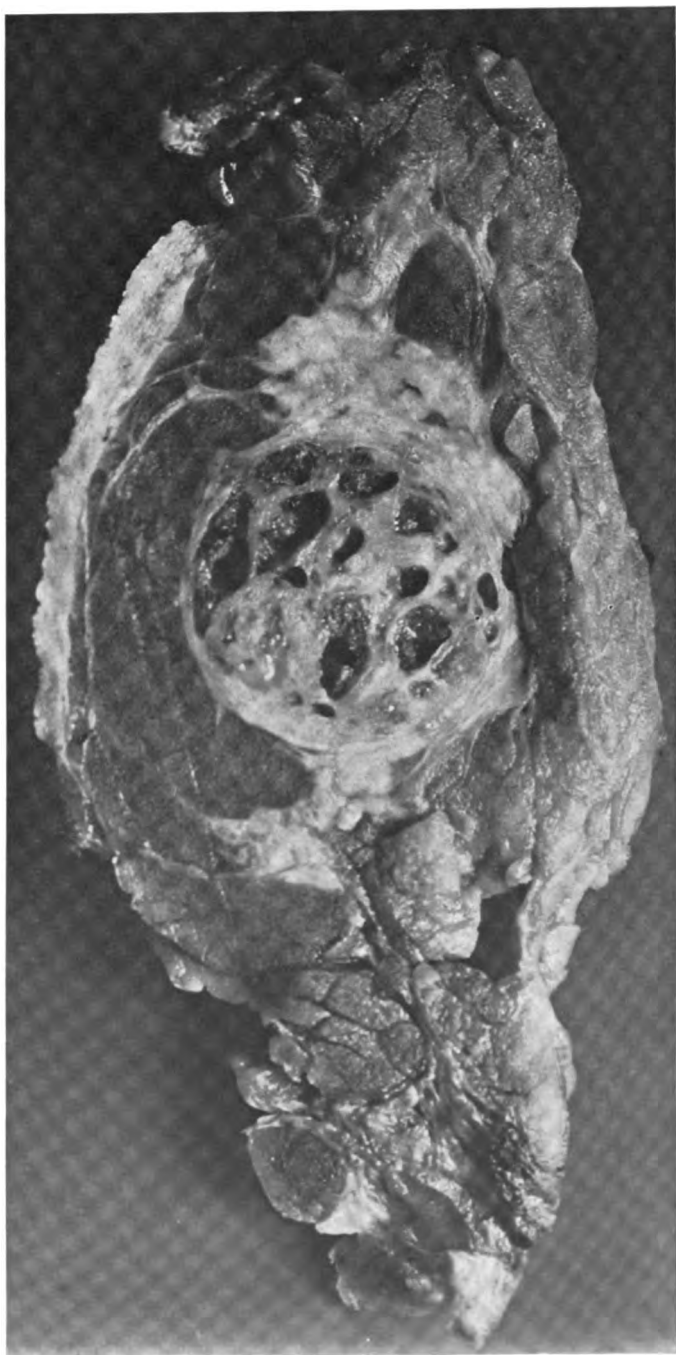
Photomicrograph of area resembling the intracanalicular myxomatous tumor in a breast containing simple cysts. (Pathol. No. 8717.)

FIG. 28.



Photomicrograph of wall of a simple cyst showing the result of the chronic inflammation due to pressure on the breast parenchyma which might be mistaken for carcinoma. (Pathol. No. 8717.)

Fig. 29.



Cystic adenocarcinoma of the breast. Photograph of section through alcohol specimen. (Specimen sent by Dr. Wegerlarth of Baltimore.) (Pathol. No. 9342.)

Gelinsky (*Zentralbl. f. Chir.*, 1908, vol. xxxv, p. 1) finds that the application of hot air to the abdomen after Bier's method gives better results than eserine, and, of course, there is no danger of intoxication. I think this method should receive immediate attention.

To repeat, I look upon the sitting position and the continuous salt per rectum, and the early-out-of-bed method, as the most important factors in the progress of the immediate and permanent results of abdominal surgery. We still look for some simple means of preventing or relieving patients of the great discomforts which may be serious, discomforts which are due to the distention of the abdomen. At the present time eserine in selected cases is the best drug, and I trust that the statements of Gelinsky in regard to hot air will be confirmed.

Appendicitis

In spite of the fact that appendicitis is perhaps the most common abdominal lesion which calls for operative interference, both as an acute and as a chronic disease, there are still many unsettled problems. Surgeons still display a difference of opinion as to the *minimum symptoms* which indicate early operation.

It is rather interesting and remarkable that the pioneer German surgeon in the operative treatment of appendicitis, Sonnenburg (*Zentralbl. f. Chir.*, 1908, vol. xxxv, p. 272; and *Mittheilungen a. d. Grenzgebieten d. Med. u. Chir.*, 1908, vol. xix, p. 109), who has perhaps had the largest experience at the Moabit Hospital in Berlin, should at this late date present a paper before his colleagues in Berlin on the *castor-oil treatment of acute appendicitis*. I find nothing like it in English literature in the last few years. Sonnenburg states that this treatment should be employed only in the hospital and only for those cases in which the clinical symptoms, temperature, pulse, the respiration, and the leukocyte count indicate that if appendicitis is present it is of the mildest type. His object in giving castor oil is to differentiate at once among these very mild cases those in which an operation should be performed at once, and to separate some of the simpler inflammatory lesions of the small and large intestine for which an appendectomy would, of course, be of no value. In Sonnenburg's hands there were no fatalities among his 171 cases. In 111 of these cases the symptoms

had been present less than forty-eight hours. It is interesting to note that in only four did the administration of castor oil give rise to symptoms which indicated an operation. This was done and the patients recovered.

In the discussion of this paper, Rotter, Karewski, and Koerte were rather of the opinion that if one could diagnose appendicitis immediate operation was indicated, and that the administration of castor oil with its resultant peristaltic action would do more harm than good. This paper of Sonnenburg suggests the most important side of the question of diagnosis. What is the general practitioner to do with patients complaining of a little abdominal discomfort, or of any symptom suggestive of appendicitis or some other abdominal lesion in which immediate operation is indicated? Shall he send his patient to the hospital to receive a dose of castor oil? I do not believe that this is necessary in this country.

While the physician is watching the patient, making a careful abdominal palpation and a differential blood-count, I am convinced that the evidence is against the use of castor oil. Nothing should be done, except an enema or salt per rectum. In the diagnosis, my experience teaches me that the general practitioner has two important things to learn: to properly perform and interpret palpation and percussion of the abdomen, and to make a proper differential leucocyte count. Not until the physician has accomplished this will he be in a position to estimate what the minimum symptoms are which indicate opening the abdomen. Books may be written on appendicitis, but if these two points are not accentuated it would have been better the books had remained unwritten.

ROVSING'S SYMPTOM.—In 1907 (*Zentralbl. f. Chir.*, 1907, xxxiv, No. 43) Rovsing described a new symptom brought out by palpation which he looked upon as important in differential diagnosis of acute abdominal lesions, especially applicable to appendicitis. Lauenstein (*Zentralbl. f. Chir.*, 1908, xxxv, p. 233), finding the symptom present in a simple case of acute cholecystitis, questions its importance. Rovsing answers (*Zentralbl. f. Chir.*, 1908, xxxv, p. 375). Then Hofmann (*Zentralbl. f. Chir.*, 1908, xxxv, p. 533) publishes a number of cases from which he concludes that Rovsing's symptom is of no value. This leads to another answer by Rovsing (*ibid.*, p. 537). This controversy allows one to get a

very good conception, first, of Rovsing's method, which he re-describes as follows: The correct employment of my method requires the careful finding and isolation of the ascending colon in the left iliac fossa. The fingers of the left hand placed close together and flat upon the skin are gently pressed down by the right hand in the iliac fossa along the brim of the pelvis, so that the small intestines are moved inward; now the colon is firmly pressed against its bed, the fingers are moved, still with firm pressure upwards towards the left flexure of the colon; this places the intestinal contents [of the colon] under sufficient pressure to act upon the cæcum. The entire method is based upon isolated rise of pressure in the colon.

I have given this description in full, because the two German surgeons who criticise the method employed it inaccurately, and for this reason we cannot accept their conclusions. Rovsing's method is simply another way of eliciting tenderness in the region of the appendix and cæcum. If one has distinct local symptoms in the right iliac fossa and Rovsing's symptom is present, it is pretty good evidence that the inflammation is confined to the appendix and cæcum; if Rovsing's symptom is absent it suggests that the tenderness in the right iliac fossa is due to a focus outside of the cæcum and appendix, for example, a pus tube. I have not had sufficient experience with this method to go further than this, but I would advise its further trial. I am, however, inclined to the opinion that it would be just as difficult to interpret this symptom correctly as to make proper palpation, and I trust that this innovation will at least have the good effect of increasing one's experience in the higher art and handicraft of palpation.

LEUCOCYTE COUNT IN APPENDICITIS.—This is an old subject with many surgeons, but it has taken years to impress the majority that a blood examination is really an important practical means for a very early diagnosis. It is remarkable that this is still neglected. In practically every German contribution the leucocyte count is spoken of as a symptom just as prominently as any other symptom. Bartlett and Smith (*New York Med. Record*, Feb. 8, 1908), Noehren (*Annals of Surgery*, 1908, xlvii, p. 239) and Fowler (*Surgery, Gynecology, and Obstetrics*, 1908, vol. vii, p. 308) have given very good descriptions of the present views, which

simply confirm the old, of the relation of the leucocyte count to the diagnosis. My advice to the general practitioner is to get a blood counter and make the leucocyte counts in these cases.

PSEUDO-APPENDICITIS HYSTERICA.—Von Rothe (*Zentralbl. f. Chir.*, 1908, xxxv, p. 338) calls attention to the contribution of Kausch (*Mittheilungen a. d. Grenzgeb. d. Med. u. Chir.*, 1907, vol. xvii, p. 469), who in his article on the subject of manifestations of hysteria in surgery, reports among other cases eleven exhibiting the symptom-complex of appendicitis. Von Rothe desires to have his observation considered as a twelfth case. Although, I think, one will agree that in Von Rothe's description of his observation hysteria may be looked upon as the factor, yet from the standpoint of appendicitis it is a very roughly studied case. In the first place, there is no blood-count; in the second place, the patient had been complaining for at least ten days, yet it was diagnosed "acute" appendicitis. Appendicitis usually either recovers, forms an abscess, or gives rise to peritonitis within three days. If one sees a patient after three days and there are no signs of general peritonitis, look for an abscess. If this cannot be made out, study the local symptoms carefully. As in every other case, a blood-count will be very valuable. Von Rothe's patient was a servant girl who began on April 11 to complain of epigastric distress; this continued for eight days; on April 19 she began to vomit, and the pain was referred to the right iliac fossa. When examined on April 22, eleven days after the onset of the epigastric discomfort, and three days after the beginning of the vomiting, the patient lay in bed with the thighs flexed on the abdomen, but her facial expression, pulse, and respiration practically excluded general peritonitis. When palpation was done, it is stated that the right rectus was tense and that there was great pain and tenderness in the right iliac fossa; there was but slight elevation of the temperature. No blood-count was made. As a matter of fact, it could not be considered a very acute case of appendicitis, because they did not operate until the next day and then they removed a normal appendix. I think this case can be used as an example to illustrate the incompleteness of the examination of a patient complaining of abdominal pain. From my own experience of cases of this kind, I am inclined to think that if this girl was really hysterical, the

surgeon, sitting quietly at her bed-side and engaging her in conversation, could have diverted her attention and demonstrated that there was really no muscle spasm. I have quite frequently, with such patients, succeeded in doing this in various ways. Of course it is possible in Von Rothe's case that there may have been a gastric ulcer. The symptoms in this case are more like those of a gastric ulcer than appendicitis. I do not think such incompletely studied cases should be recorded as examples of pseudo-appendicitis hysterica or any other abdominal lesion.

It is interesting to note that Von Rothe in retrospect is of the opinion that if he had known of Rovsing's symptom it might have been a great aid to him in the differential diagnosis in this case.

APPENDICITIS AND TETANY.—The observation reported by Chas. H. Goodrich (*Annals of Surgery*, December, 1908, vol. xlviii, p. 859) is an excellent one to illustrate the minimum symptoms which justify opening the abdomen in the face of other symptoms suggestive of a disease for which operation is not indicated. The example of the differential diagnosis between appendicitis and abdominal neurosis has just been cited. Here the question was: Could the abdominal symptoms and leucocytosis all be explained by gastro-intestinal tetany? I am not convinced that Dr. Goodrich's patient had tetany, but there is no doubt as to the fact that he had acute appendicitis. This attack of not more than fifteen hours' duration followed immediately a huge meal of indigestible food. In addition to the usual vomiting and epigastric pain associated with acute indigestion there was localized pain in the right iliac fossa, a total leucocyte count of 23,250. In the differential count there were 78 per cent. of the polymorphonuclear leucocytes. The temperature was 102°. Dr. Goodrich based his assumption of appendicitis on the localized tenderness, the slight muscular rigidity, and the leucocytosis. The appendix, when exposed, was gangrenous in the early stage. The diagnosis of gastro-intestinal tetany was based on the rigidity of the muscles of the arm, the thumbs were held in tonic contraction against the palms of the hands, the feet were extended and sensitive. Further than this there are no notes on the clinical picture of tetany in this case, but the symptoms described disappeared rapidly after operation. Goodrich is of

the opinion that the inflammation of the appendix was the cause of the tetanic condition of the muscles of the extremities.

The most recent communication on tetany by MacCallum and Voegtlin (*Jour. of Experimental Med.*, Jan., 1909, vol. xi, 118) gives a very clear description of the etiological factors and the clinical picture. It is to be hoped that Dr. Goodrich will describe his case in greater detail, because, as far as I know, no case of gastro-intestinal tetany has been observed with appendicitis. Dr. Goodrich is to be congratulated that he did not permit the symptoms suggestive of tetany to mislead him. From the work of MacCallum we now know that in such cases (tetany) calcium salts are immediately indicated.

APPENDICITIS AND PELVIC LESIONS.—This differential diagnosis is important, because it seems to be the opinion that in some pelvic lesions immediate operation is not indicated, while, of course, we know that the reverse is true in appendicitis. It has always been my experience that in the first twenty-four or forty-eight hours the differential diagnosis can be made with certainty in such few cases that it is safer to explore the abdomen in all. I now find that Rinne (*Zentralbl. f. Chir.*, 1908, xxxv, p. 649) from a large experience has come to the same conclusion. He is also of the opinion that in pregnant women operation is imperative with as little delay as possible, because the pathologic lesions of the later stages of appendicitis are hardly compatible with the pregnant state, and if death does not follow from peritonitis miscarriage will most certainly take place.

APPENDICITIS AND KIDNEY LESIONS.—There is a distinct clinical type of appendicitis which I have called perinephritic. The appendix is postæcal or postcolic, and according to the position of the appendix, the part involved, and the local extent of the inflammation the symptoms may be in the iliolumbar fossa or strictly in the lumbar—perinephritic—or in the right hypochondrium below the right lobe of the liver. In these cases there may be a pyelitis associated with appendicitis exhibiting itself by pus and blood in the urine. Guy L. Hunner (*Jour. of Amer. Med. Ass.*, April 25, 1908, vol. i, p. 1328) discusses this subject under the title "Acute Pyelitis Due to Acute Appendicitis." Seelig (*Surgery, Gynecology, and Obstetrics*, October, 1908, vol. vii, p. 485) reports a

case of appendicitis resembling ureteral calculus in which, even in the X-ray, there was a shadow resembling a calculus. In this case the appendix containing a concretion was adherent to the ureter. Seelig in a second paper (*Annals of Surgery*, September, 1908, vol. xlviii, p. 388) reports three cases of hæmaturia complicating appendicitis, and the literature. In some of these cases the pain may be referred to the testicle. When one has symptoms of renal colic, that is, pain somewhere in the region of the kidney referred to the groin and to the testicle, and this pain is associated with distinct tenderness and muscle spasm and a definite septic leucocytosis, do not allow the pain simulating renal colic to mislead you. With these symptoms explore. It is either appendicitis or acute pyogenic infection of the kidney, in both of which lesions early operation gives the best results.

ETIOLOGICAL FACTORS OF APPENDICITIS.—Interesting as these may be they do not help us in estimating the minimum symptoms which would indicate operation. I should like, however, to refer to some of the most recent papers for the benefit of those who are especially interested in the subject. The appendix may be in an unusual position, which of itself, on account of interference with circulation, may lead to the clinical and pathological picture of appendicitis. Janssen (*Beiträge z. klin. Chir.*, 1908, vol. lix, p. 547) describes a few such cases. There is no doubt that trauma may give rise to appendicitis. This subject is considered by Bruening (*Archiv f. klin. Chir.*, 1908, vol. lxxxvi, p. 907) and Strohe (*Deutsche Zeitschr. f. Chir.*, 1908, vol. xcv, p. 43). Klemm (*Archiv f. klin. Chir.*, 1908, vol. lxxxv, p. 925) is more interested in the relation between fecal concretions and appendicitis. There is no doubt that there are other causes outside of the appendix, and these—the hæmatogenic—are very carefully considered by Canon (*Deutsche Zeitschr. f. Chir.*, 1908, vol. xcv, p. 21) and Hoenck (*Mittheilungen a. d. Grenzgeb. d. Med. u. Chir.*, 1908, vol. xix, p. 79).

DIVERTICULUM OF THE APPENDIX.—I mentioned this condition with references in *INTERNATIONAL CLINICS*, vol. i, series 16, April, 1906, p. 297). Upcott (*Surgery, Gynecology, and Obstetrics*, 1908, vol. vi, p. 454) collects the cases that have been observed from the Hull Royal Infirmary and also from the Leeds General Infirmary.

The paper is illustrated with very good gross and microscopic studies. The case reported and pictured by George Ben Johnston (*Surgery, Gynecology, and Obstetrics*, 1908, vol. vi, p. 614) I had the opportunity to examine in both the gross specimen and microscopic section.

CARCINOMA OF THE APPENDIX.—Monks (*Annals of Surgery*, 1908, vol. xlviii, 563) remarks after the report of his case: "Apparently the attack of appendicitis was an important factor in saving the patient's life." In this case there are good microscopic illustrations of the malignant fibro-epithelial tumor, which, however, in its growth has not infiltrated the muscularis. Histologically the tumor must be looked upon as a carcinoma, but that the tumor is still so circumscribed is an indication that for practical purposes the epithelial activity is still a very local one.

Monks reports this observation five and a half years after the operation.

Harte (*Surgery, Gynec., and Obst.*, 1908, vi, p. 725; *Transactions Amer. Surg. Ass.*, 1908, xxvi) has collected 111 cases. These he presents briefly with a very complete bibliography up to date. In addition to this very comprehensive communication of Harte I have been especially impressed with the papers of Vassmer (*Deutsche Zeitschr. f. Chir.*, 1908, xci, p. 445) and Voeckler (*Archiv f. klin. Chir.*, 1908, lxxxvi, 477).

For one interested in the accumulation of evidence to add to the proof that carcinoma in its beginning is a strictly local disease the appendix carcinoma can be utilized perhaps better than any other. A glance at the illustration of Monk's case clearly shows that this appendix was the seat not of a colloid or an early adenocarcinoma, but of a pretty typical carcinoma; and yet this patient has remained well five and a half years after the removal of the appendix. Voeckler was able to find but one of the early appendectomy cases to show later recurrence in the shape of metastasis to the mesenteric glands (Lejars's case, Case XXVIII, p. 426; Harte, *loc. cit.*). All these authors dwell upon the fact that the carcinoma as it infiltrates the appendix causes symptoms of appendicitis of all degrees, from the minimum to those associated with peritonitis and perforation. For this reason such tumors are removed early, because surgeons now all over the world operate at

once in all forms of acute and chronic appendicitis. The carcinoma is but an accidental finding, frequently not diagnosed until the routine microscopic section. Vassmer demonstrates that if the carcinoma is present in the middle third of the appendix it gives rise to clinical symptoms earlier and for this reason the prognosis is better.

Surgery of the Liver

For a number of years the problems involved in the diagnosis and treatment of cholecystitis and stones in the gall-bladder and bile-ducts and their relation to acute and chronic pancreatitis occupied so much attention that the less frequent lesions of the liver were to a certain extent overlooked. In the Index of vols. i to xxvi of the *Transactions of the American Surgical Association* beginning with the year 1880 there are but two papers devoted to lesions of the liver, both on tumors. Quietly, however, a very comprehensive literature on injuries, tumors, abscess, and cirrhosis of this organ has accumulated. Jenckel's contribution (*Deutsche Zeitschrift f. Chir.*, 1908, xcvi, 254) is the most recent.

INJURIES AND HEMORRHAGE.—Pringle (*Annals of Surg.*, 1908, xlviii, 541), from a clinical and experimental study on the arrest of hepatic hemorrhage due to trauma, advises the seizing of the portal vessels as soon as the abdominal cavity is opened, using the hand as the immediate but temporary hæmostat. For the checking of hemorrhage Pringle prefers if possible the ligature, although in some cases one will have to depend on packing.

Van Buren Knott (*Annals of Surg.*, 1907, xlvi, 790) describes and pictures a new liver suture. Neumann (*Zentralblatt f. Chir.*, 1908, xxxv, 47) describes his experience with twenty-two cases of injury of the liver. He discusses three problems: the minimum symptoms which must be looked upon as indication for operation, the methods of checking hemorrhage, and the question what to do with partially separated pieces of liver in which the circulation is threatened. Neumann employs huge quantities of gauze packing rather than suture, with good results; and he prefers the removal of partially separated pieces of liver.

CIRRHOSIS.—In the recent literature we see fewer references to the surgical treatment of cirrhosis which has become known as Talma's operation. Corson (*Annals of Surgery*, 1907, xlvi,

831) discusses his experience with Narath's modification of the Talma operation. Corson is of the opinion that it has not been given sufficient attention in this country. In this method the omentum is sutured in the abdominal wound through one or more incisions. Personally, this is the method which I have employed in the last four years with apparently good results.

Bunge in 1905 (*Klin. Jahrb.*, vol. xiv) collected all the cases from the literature. Since then there has been no collective review that I can put my hand on, but Lieblein (*Mittheilungen a. d. Grenzgeb. d. Med. u. Chir.*, 1908, vol. xviii, 794) in reviewing the experience of Woelfler's clinic in Prague refers to Bunge's as the latest monograph. I think it can be safely stated that surgical intervention in cirrhosis of the liver promises more than any other line of treatment. Success depends upon the stage of the cirrhosis in the liver and perhaps more upon the condition of the other organs.

ABSCCESS.—I should like to refer to the very interesting paper of Oertel (*Arch. Int. Med.*, 1908, i, 385) on the early stages of hepatitis, especially the relation to lymphangitis and perilymphangitis. There is one very important paper by Rogers (*Arch. Int. Med.*, 1908, i, 508 and *Philippine Jour. of Science*, Sept., 1908, iii, 285) on the employment of ipecac as a preventive in the pre-abscess stage of amœbic hepatitis.

Fig. 30 illustrates an abscess of the liver found at autopsy.

TUMORS OF THE LIVER.—On the true cysts there is no report as complete as that by Hoffmann in 1902 (*Mittheilungen a. d. Grenzgeb. d. Med. u. Chir.*, 1902, x, 476). Caminiti (*Archiv f. klin. Chir.*, 1903, lxi, 630) reports on the very interesting and rare solitary adenomata of the liver, which belong to the class of functioning tumors similar to fibro-adenomata of the breast which exhibit with the breast lactation after pregnancy, and the adenomata of the thyroid. Brewer and Gies (*Jour. of Amer. Med. Ass.*, June 20, 1908, i, 2063) report on the injury of the portal vein during an operation on a hydatid cyst of the liver. In this case they first employed digital pressure recommended by Pringle (*loc. cit.*) and as the injury was beyond the hope of repair the vein was ligated. The patient recovered and careful examination for six months after the operation failed to detect any change in

FIG. 30.



Abscess of liver. Pen-and-ink sketch of section through liver abscess removed at autopsy. (Pathol. No. 9051.)

FIG. 31.



Carcinoma of aberrant pancreas. Tumor behind head of pancreas. (Pathol. No. 9136.)

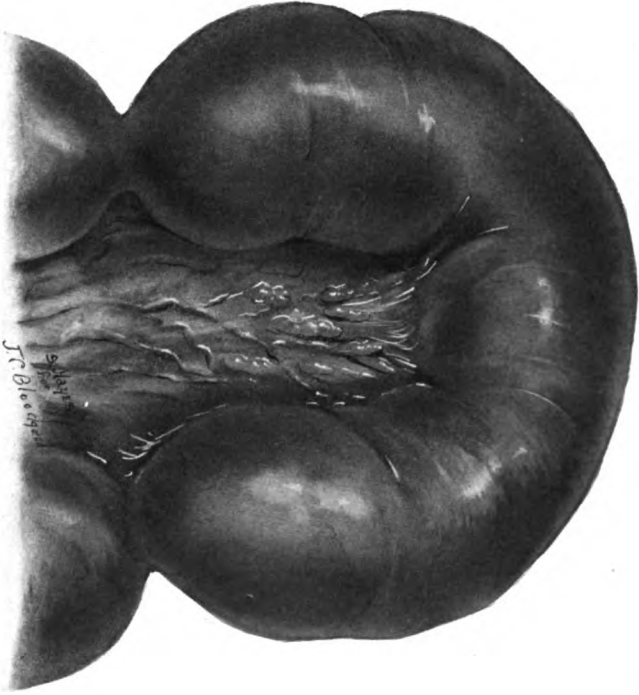
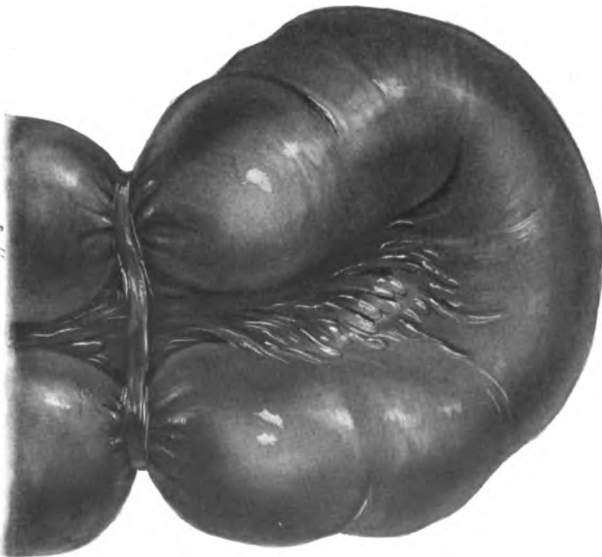
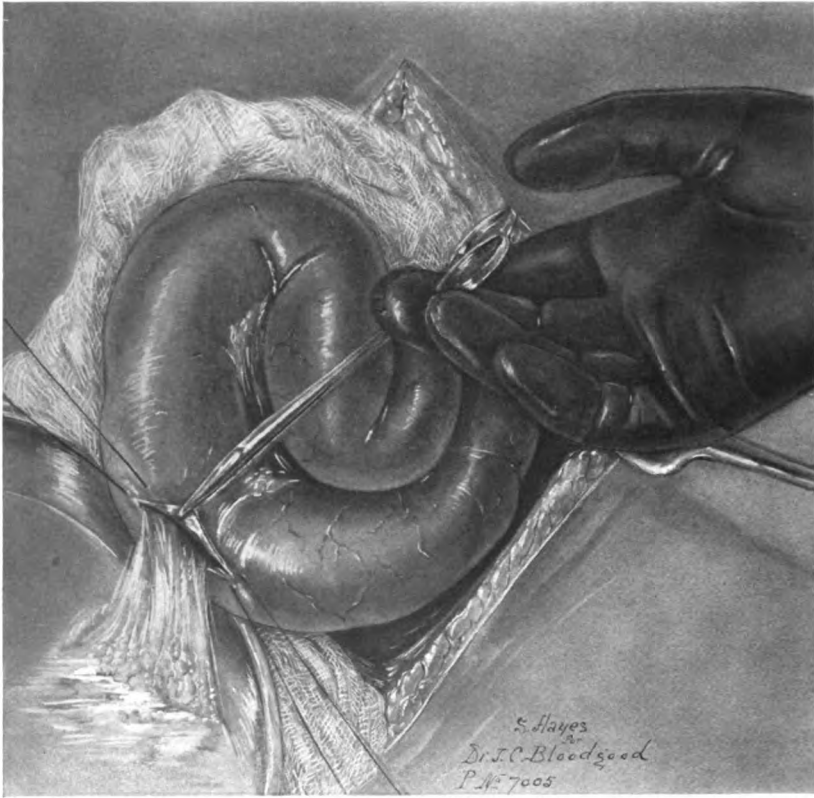


FIG. 32.



Intestinal obstruction due to a band. (Surf. No. 16486.)

FIG. 33.



Intestinal obstruction. Method of emptying the distended intestine at operation. (Pathol. No. 7005.)

metabolism which could be attributed to the ligation and its effect upon the liver. Beresnegowski (*Zentralbl. f. Chir.*, 1908, xxxv, 151), on the other hand, reports an observation in which it is conclusively demonstrated that ligation of the hepatic artery is not followed by the same negative and happy result as that of the portal vein. The patient was a female aged 46, the tumor of the gall-bladder of one year's duration; there were no other symptoms. In removing it, the right branch of the hepatic artery was ligated by mistake. The patient died seventy-two hours later. The bloodless right lobe of the liver had the appearance of clay, and on section there were numerous little nodules surrounded by dark-red rings. The cellular picture showed the changes due to sudden anæmia.

Torrance (*Annals of Surgery*, 1908, xlvii, 33) reports a single case in which practically the entire left lobe of the liver was removed. Judging from the description of the operation the tumor, which weighed two and a half pounds, with dimensions of 20 x 43 x 12 cm., was removed rapidly and without hemorrhage, and there was no shock at the end of the operation. The patient, however, died within twenty-four hours with a terminal temperature of 107°. There was no autopsy. Torrance gives no literature and makes no comment on his very interesting case. The tumor proved to be a hopeless melanotic sarcoma, probably metastatic.

When Cullen (*Jour. of Amer. Med. Ass.*, April 22, 1905) reported his remarkably successful case of resection of a large tumor of the right lobe of the liver he gave in his paper a very good summary of the literature up to date. Van Buren Knott (*Surgery, Gynecology, and Obst.*, 1908, vii, 328) in his paper on primary sarcoma of the liver brings the literature up to date with ninety-five references.

I am inclined to the opinion that there is good reason that surgery of the liver should take a more prominent place.

Surgeons must be more keen in the recognition of hemorrhage. These injured patients with ruptured liver can be saved if the abdomen is opened quickly enough. The cases of cirrhosis which have been operated on should be restudied, in order that we may obtain a more definite view of the ultimate results. Apparently at this time Talma's operation and its modifications are justifiable

operations. There is room for improvement in the early diagnosis of abscess, no matter what its etiological factor. Fig. 30 is an operable abscess found at autopsy. We shall await with interest further experience with ipecac given in amoebic dysentery, with the hope that it will prevent abscess of the liver. The technic of resection of large portions of the liver is sufficiently established to justify intervention in operable primary tumors with, I am confident, a chance of a fair percentage of cures.

Surgery of the Pancreas

The more important additions to this subject have been discussed in previous numbers of *INTERNATIONAL CLINICS*. Mayo Robson and Cammidge have presented the surgery and pathology of the pancreas in a new volume (Wm. B. Saunders Co., 1907). The book is a contribution chiefly to the chemical features of pancreatitis.

It is pretty well conceded that the cause of death in acute hemorrhagic pancreatitis is trypsin alone or in combination with other ferments of the pancreatic juice. In acute hemorrhagic pancreatitis the blood-stained peritoneal effusion contains these ferments. The experimental work which demonstrated this immediately establishes a practical conclusion. In this acute disease the abdomen should be opened at once and drainage instituted to the inflamed pancreas. There has never been any question in regard to the proper treatment of pancreatic abscess.

The most interesting feature at the present time is the recognition of chronic pancreatitis in cases of jaundice, in which, on opening the abdomen, there may or may not be stones in the common duct. If stones are present in the common duct and the surgeon overlooks the chronic indurative pancreatitis he will be surprised to find that removal of the stones and drainage do not relieve the obstruction. It is the opinion to-day that one should force an instrument with care and gentleness through the lower third of the duct into the duodenum. If the head of the pancreas is indurated and the duct cannot be dilated anastomosis must be made between the gall-bladder and a loop of intestine. As such cases are not very frequent they are usually overlooked.

The case illustrated in Fig. 31 presented itself clinically as obstructive jaundice. I was surprised to find at operation that

the tumor, instead of involving the head of the pancreas, was situated behind the head of the pancreas. It was a carcinoma and inoperable. In attempting to ascertain whether the tumor was operable or not I divided the pancreas through the body. Later this was sutured with catgut. The approximation was so perfect that no drainage was employed. The patient made a good recovery from the exploratory operation. My colleague Dr. Finney has just removed a tumor about the size of a fist from the middle of the pancreas. I use these two cases simply to illustrate that if one employs careful hæmostasis, division of the pancreas can be made with impunity. If the tumor is operable and one can leave pancreatic tissue in the head end, radical excision is justifiable. The most important point is to prevent leakage of pancreatic secretion with the resultant acute hemorrhagic pancreatitis and fat necrosis.

Intestinal Obstruction

During the last two years I have examined again the records of my own cases and those in the surgical clinic in the Johns Hopkins Hospital, in all about 150 cases. I have studied as much of the literature as time would allow, with the following conclusions: The cause of death in intestinal obstruction when there is no peritonitis from perforation or gangrene is due to a toxæmia, clinically like that in acute pancreatitis. The toxins come from the intestinal contents above the point of obstruction. There is room for a very important experimental study on this subject. It would be interesting to know whether obstruction of the intestine produces a hypersecretion. In acute dilatation of the stomach from gastro-mesenteric ileus there is undoubtedly hypersecretion. Is the intestinal secretion above the point of obstruction normal or pathological?

In spite of no experimental data to help them surgeons have come, from their clinical experience, to pretty definite conclusions. The best results are obtained when the abdomen is opened and the obstruction relieved with twenty-four hours, if possible, after the first symptom. Physicians must therefore make their diagnosis earlier. They must appreciate abdominal pain that produces peritoneal shock, not overlook the primary vomiting, examine carefully for Von Wahl's tumor sign, and make a blood-count. In the

presence of these stormy symptoms they must give morphine guardedly, never administer cathartics, employ the rectal tube once or twice only, and the stomach tube if there is much vomiting. When physicians assume this attitude of observation and non-interference, and employ means like the stomach and rectal tube and not dangerous drugs like cathartics, I am confident that the acute intestinal obstruction will be recognized earlier. In all the cases the records of which I have examined, there is not one in which a careful examination within the first twenty-four hours could not have made the diagnosis.

When the surgeon opens the abdomen in early cases the problem is a simple one—all he has to do is relieve the obstruction. How simple this may be is shown in Fig. 32. Of course, even in early cases the relief of the obstruction may be a complicated affair, for instance, when there are extensive adhesions. In the presence of gangrene of the intestine one must bring out the loop and resect then or later according to the condition of the patient.

These are simple problems compared with the decision of when to evacuate the contents of the intestine above the obstruction as illustrated in Fig. 33, and when to leave an enterostomy.

In the case illustrated in Fig. 32 nothing was done but the division of the band; this relieved the obstruction, but the patient died. That is, in this case, the surgeon should have emptied the intestine and provided for drainage by enterostomy. Monks of Boston has carried this idea further (*Annals of Surgery*, June, 1908, xlvii, 953) and has made numerous experiments to see if it is possible to flush the entire intestinal canal through multiple enterotomy openings.

The more serious the case the more justifiable are such desperate measures as that of Monks.

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